A Database Publication

THE MICRO USER

Volume 6
Number 12
February 1989
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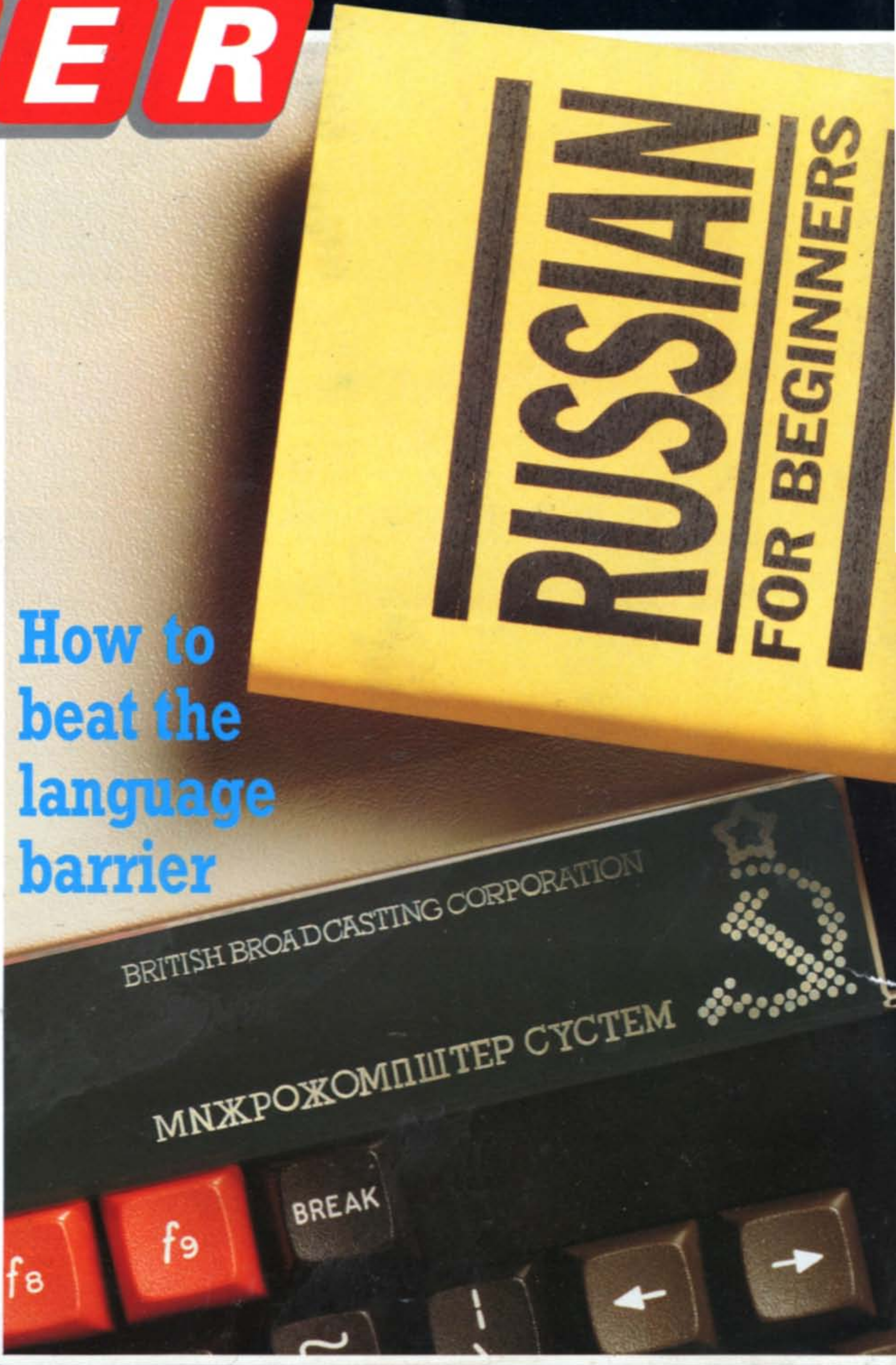

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GALAFORCE 2
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A & B Computing (September 1988)

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HOPPER
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"It's great fun . . . an excellent version of the arcade favourite. Highly recommended". . . . Micro User

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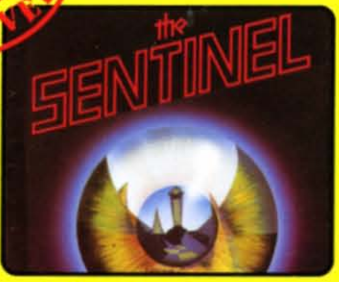

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Unfortunately it is not technically possible to produce an Acorn Electron version of THE SENTINEL. The four games on the Acorn Electron version of PLAY IT AGAIN SAM 6 are: GALAFORCE 2, HUNCHBACK, HOPPER and VIDEO'S REVENGE.

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Published by:
Database Publications Ltd,
Europa House, Adlington Park,
Adlington, Macclesfield SK10 4NP.

Subscription rates for
12 issues, post free:

£18 – UK
£28 – Europe (incl. Eire)
£34 – Overseas Surface
£45 – Overseas Air

ABC 40,376
Jan-June 1988
ISSN 0265-4040

The Micro User welcomes program listings and articles for publication. Material should be typed or computer-printed, and preferably double-spaced. Program listings should be accompanied by cassette tape or disc. Please enclose a stamped, self-addressed envelope, otherwise the return of material cannot be guaranteed. Contributions accepted for publication will be on an all-rights basis.

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News trade distribution: Diamond Europress Sales & Distribution, Unit 1, Burgess Road, Ivyhouse Lane, Hastings, East Sussex TN35 4NR. Tel: 0424 430422.

Database Publications is a division of Europress Ltd

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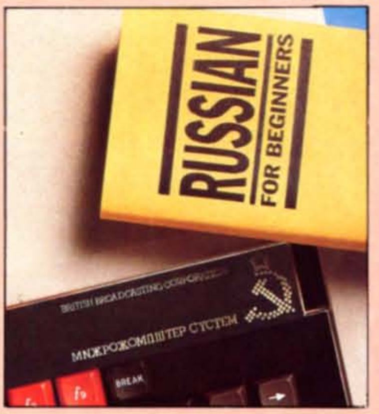
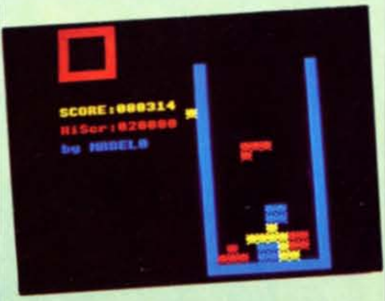


Cover story

Watch your language!

Now you can create foreign characters on your BBC Micro. With this type-in utility you can key in perfect text every time in Russian – or, with a little work, any other non-standard language. Turn to Page 22.

Games for all



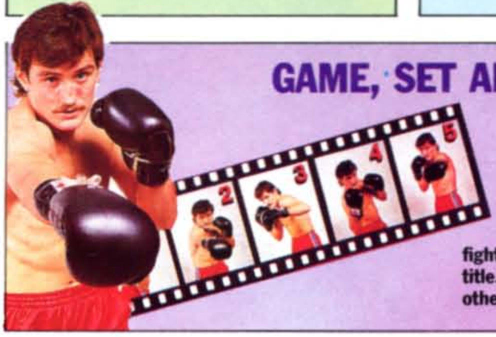
This month you can play a clever version of a stunningly original game from the USSR.

Plus, for Archimedes users, a very challenging implementation of a classic arcade game in ArcRoids.

New series

In April Acorn will be releasing its world-beating Risc OS multi-tasking system for the Archimedes. As a preview we start a series of articles that tells you what you to expect and how to get the most out of it. Turn to Page 47.

GAME, SET AND MATCH



To celebrate the exciting By Fair Means or Foul boxing game for the BBC Micro, we present a great competition that gives you the chance to see the famous Barry McGuigan in his fight to gain the world featherweight title. And there's over £500 worth of other great prizes. Turn to Page 20.

MICRO USER CLASSIFIEDS

The best bargains in the world of the BBC Micro come from fellow readers of *The Micro User*. Turn to **Page 124** to find just what you're looking for – from cheap modems to complete computer systems.

✓ **Our Checksum routines will help you to find your typing errors when keying in listings. For full details of how to use them, see the article on Page 48.**

✳ **The Type-it-in symbol indicates that the feature contains at least one full length listing for you to key in on your micro.**

NEXT MONTH

STATISTICS
Five packages compared

CARDBOX
A superb index utility

DESIGN
Create animated displays

EDUCATION
Play Odd One Out

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NEWS beat

Micros to help air safety?

CROWDED skies and stressed air traffic controllers are a growing source of aggravating delay and potential danger for air travellers. Lack of trained controllers is a large part of the problem but a training aid developed on the BBC Master could now be called to the rescue.

At Stansted, the Civil Aviation Authority is evaluating a new simulation system recently upgraded to the Archimedes. Tony Archer, a controller at Lydd airfield, combined with a systems programmer friend to produce the simulator after three years work.

They formed the Surrey based company Woodmarsh (0797 26236) to develop AART – Approach Area Radar Trainer – which they say is the first low cost system of its kind based round an off the shelf micro.

It gives trainees full radar simulation of background airspace and control zone positions. Using a second machine and a radio simulator, also designed by Woodmarsh, a flight operator takes the role of pilot to respond to the trainee's instructions.

The idea started when Tony was finding difficulty training for his radar controller's qualification. It can be a very costly business, with most training being on mainframe computers at residential centres.

"I thought it would be great to have a simulator myself", he told *The Micro User*. "A friend of mine is a genius at programming, so we got together".

They started with a system for the Sinclair QL graduating to the Master and then opting for the speed of the Archimedes.

"I think we are ahead of the game but it is very early days yet", said Tony. "There is definitely a controller shortage at the moment because there has been very little money for training.

"Now the CAA suddenly realises it has not got enough people, there is great interest in any training aids that will help get them through quickly".

If the CAA gives its seal of approval to AART it could put 24 systems into its towers. Tony also hopes to interest independent airfields in it. He is also thinking of converting it into a game.

Your life in his hands: An air traffic controller at work

BARNARDO's will benefit from a generous offer made by Harrow-based Supersoft (01-861 1166). The company is giving away software worth £50,000 to people making donations to the childrens charity, much of it for the BBC Micro and Electron.

Peter Calver, managing director of Supersoft explained: "We have a large supply of surplus stock from the last five years. Anyone who writes to us enclosing a donation to Barnardo's will receive a program".

He told *The Micro User*: "These programs would normally have gone for sale on markets and, since we receive very little from this, we decided to put them to better use.

"If it is successful, we hope that other software houses may also join in by donating their surplus stocks".

The offer is on a pot luck basis with no specific software named.

Cheques and postal orders should be made payable to Barnardo's and sent to Barnardo's Offer, Winchester House, Canning Road, Wealdstone, Harrow, HA3 750.

Helpful words from BBC Micro

SIX million adults have reading, writing and spelling problems and many could benefit from a new aid on the BBC Micro range.

The Wordwise Plus Literacy Pack from Special Needs Software (041-357 1659) is the result of three years work by educationalists Jacquetta Megarry and Eric Deeson.

Funded by the Learning Technology Unit of the Training Agency, it builds on the success of Wordwise Plus, the UK's best selling word processor for BBC Micro.

It allows tutors to tailor information to the individual needs of their students.

The pack, complete with tutor's booklet, summary cards, reference cards and self-study word processing course costs £33.35. With Wordwise Plus chip it costs £56.35.

Artisan upgraded

CLARES Micro Supplies (0606 48511) has released ProArtisan, its new graphics package for the Archimedes.

With 256 colours available, ProArtisan works in Mode 15 and is a follow-on from Clares' Artisan package.

It has features making it useful to both ends of the artistic scale: Those who cannot draw can get good results from the image manipulation package yet the scope of the software can provide powerful facilities for education.

The new package has many extensions to Artisan including a wider fill menu and more sprites. Drawing is improved with an airbrush, rainbow pens and an extensive magic brush.

A font designer is also included in the toolkit menu with 26 fonts supplied on disc and there are 19 new printer dumps in mono and colour.

ProArtisan costs £169.95.

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NEWS beat

Archimedes goes into battle

BEFORE they go into action, young soldiers can now experience realistic battlefield conditions thanks to the Archimedes.

Westland System Assessment of Yeovil (0935 24545) has used the powerful graphics and sound facilities of the Archimedes for WIFT, its Westland direct Fire Trainer system. Its micro generated graphics projected on a large screen are used for gunnery and mortar training.

Target positions are set up, then students calculate grid references and select their choice of mortar or artillery and fire. The Archimedes then runs full sound and graphics simulation of the shot.

Already the Irish Army has installed one of the systems at its infantry weapons school at McDonagh Barracks, The Curragh. British army bases in Bristol, Wiltshire and Berlin use it and John Davies of Westland reports growing interest from UK and overseas markets.

STITCHING

A STITCH on line brought Mold based Clwyd Technics (0352 741751) to the finals of the Welsh National Business Awards.

Its system to design patterns by linking Master 128 and BBC Bs to Knitmaster knitting machines put the company in the final three of the New Enterprise section of the awards run by HTV and Western Mail.

TICKING

THE November issue of *The Micro User* included an article about Rubik's Clock. We have been asked to point out that Rubik and Rubik's Clock are the trade marks of Seven Towns Ltd, 7 Lambton Place, London W11 2SH.

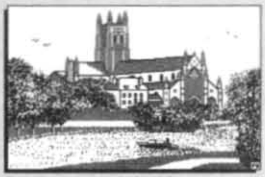
BBC Micro helps cathedral appeal

GRAPHICS artist Paul Bayley of Malvern has enlisted the help of his BBC Micro in an appeal to raise £4 million for the restoration of Worcester Cathedral.

His artistic talents were turned to the cathedral appeal when his 14-year-old daughter was asked to take part in a poster competition at her school.

Paul remembered he had used his BBC Micro to draw the cathedral two years ago and had kept it on disc. It took only a few deft strokes with his pixel editor to give a graphic "before and after" view of the potential plight of the historic building.

He erased the cathedral's central tower which could collapse within 15 years if nothing is done to preserve it.


Paul's original drawing

And the end result was so well received by the Dean and Chapter that they passed it on to the Australian company brought in to tackle the job of raising the £4 million appeal target.

Paul's two cathedral views will now be used as a graphics first in the prestigious Worcester Choral Society's annual programme.

"The original drawing took me just over a week to complete, working in the evenings", said Paul. "It was then an easy matter using the pixel editor to erase any part of the building and I think the end result was very effective".

Little oaks from giant Acorn

ACORN has presented two saplings to Treetops School, Grays, Essex to replace trees lost from the school's grounds in the 1987 storms.

Treetops caters for children with learning difficulties and boasts several BBC Masters. It has plans to install a further six machines aiming at a micro in every classroom.

The sapling oaks were presented by Katherine Pierpoint, corporate communications coordinator for Acorn, and received by the Mayor of Thurrock, Councillor George Watts, who performed the planting ceremony. Also present were headmaster Mike Smith, school governors and 106 pupils.

Masterly gospel songs

AFTER only five months computer experience, a 34 year-old Newcastle teacher has composed a suite of five original gospel songs using a BBC Master and Hybrid 4000 music system.

"Suck it and see orchestration" is Dave Blackwell's term for his first venture into micro music composing and he is now a convert.

"I wanted to use the micro as a creative tool", he said. "You often write a piece then wish you had made alterations. With the Master and Hybrid system, I could make the changes as I went along to get it just right".

Head of music at Redewood School, Newcastle upon Tyne, Dave is on Educational Support Grant secondment in the area, showing teachers how to be more creative with their music use of computers.

BURNINGS, beheadings and battles have come to the Archimedes courtesy of US Gold (021-356 3388). For its first venture on the Archimedes games front, Gold has chosen the acclaimed Joan of Arc, originally developed in France.

A complex game, it includes a lot of violent action mixed with historical detail. It costs £32.99

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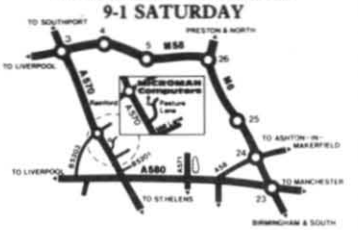

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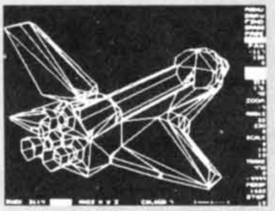


3D CAD for Arc

NEW from Silicon Vision (01-861 2173) is its 3D draughting system SolidCAD for the Archimedes. In addition to 3D views it allows drawing in plan, front and side elevations making it a useful tool for architects, engineers and teachers.

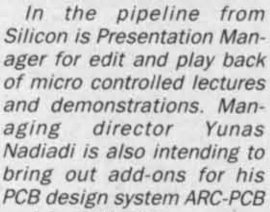
There are zoom and pan options for precision draughting and surface definition for creating solid colour objects.

Silicon has followed up its BBC Micro version with one for the Archimedes which includes a shading facility for added realism. It costs £49.95.

For more sophisticated design, Realtime Solids Modeller on the Archimedes has high speed animation and costs £89.95 or £40 to upgrade from SolidCAD.

Another new product from the company is RiscBasic for speeding up Archimedes Basic programs by compiling them automatically into pure ARM Risc code. It costs £99.95.

In the pipeline from Silicon is Presentation Manager for edit and play back of micro controlled lectures and demonstrations. Managing director Yunas Nadiadi is also intending to bring out add-ons for his PCB design system ARC-PCB and for SolidCAD.



Superior promises more

BROTHERS Richard and Steve Hanson of Superior Software (0532 459453) have added a number of new games titles to their stable and promise more are on the way.

First on the list is a BBC Micro version of Elite's Question of Sport which has now survived initial packaging problems.

Breaking all pre-release mail order records for Superior, Repton Infinity is a massive four game package complete with a new games creation language and 72 page games creation manual. It costs £12.95 on casette, £14.95 on disc – £19.95 for the Master Compact.

Superior has also put out BBC Micro versions of Play It Again Sam 6 and System 3's Last Ninja. The Repton series comes to the Archimedes for the first time with Repton III.

Other BBC Micro rights acquired by Superior are Palace's Barbarian II and Mediagenic's Predator which should be available soon.

For the results of *The Micro User* Barbarian competition and details of our latest contest see Page 20.

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User Manual

CAMBRIDGE Computer (0233 312216) has brought out a promotional pack for the Cambridge Z88 laptop.

It includes carrying case, mains adapter, four batteries, a 128k ram pack, an updated user manual and a Z88. Price £344.94.

Way with Wimp

SIMITRON (0342 28188) has launched Archway, an aid to people who want to write programs running under the Archimedes Wimp.

Archway provides a program creation environment including tools, script shells, run-time code, a library of functions and procedures and extensive examples.

It costs £79.95 and the Risc OS version will be £95.95. Early orders will get a free upgrade to Risc OS.

Presenting products in a really big way

SLIDES upside down or in the wrong order are a nightmare for speakers who need to illustrate their topic. At the end of February, Lingenuity (098-685 476) will launch a desktop presenter package aimed at eliminating these problems and increasing the scope of graphic displays.

Presenter Story was developed by X-Ample Technology in Holland and runs on the Archimedes. It is being published and distributed by Lingenuity, the product division of Lindis International, Acorn's export distributor.

Using Presenter Story, business and technical presentations can be projected straight on to large video screens. It makes use of the Archimedes' high resolution graphics and is available in educational, business and video versions.

Jack Lillingstone of Lingenuity told *The Micro User*: "It is a very clever package that can cover all professional presentation requirements".

Prices to be decided.

Lingenuity has also upgraded its first Archimedes hardware product, the Colour Convertor which changes the monochrome Watford Digitiser into full colour.

New additional software using error correction dithering allows the Archimedes to simulate 256,000 colours and a Mode 12 facility provides the opportunity to use digitised pictures with 16 colour software.

All existing registered users will be automatically upgraded free of charge. The Colour Convertor package costs £195.44.

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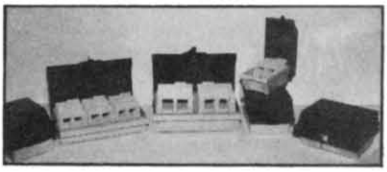

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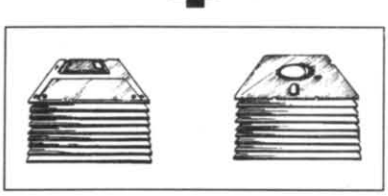

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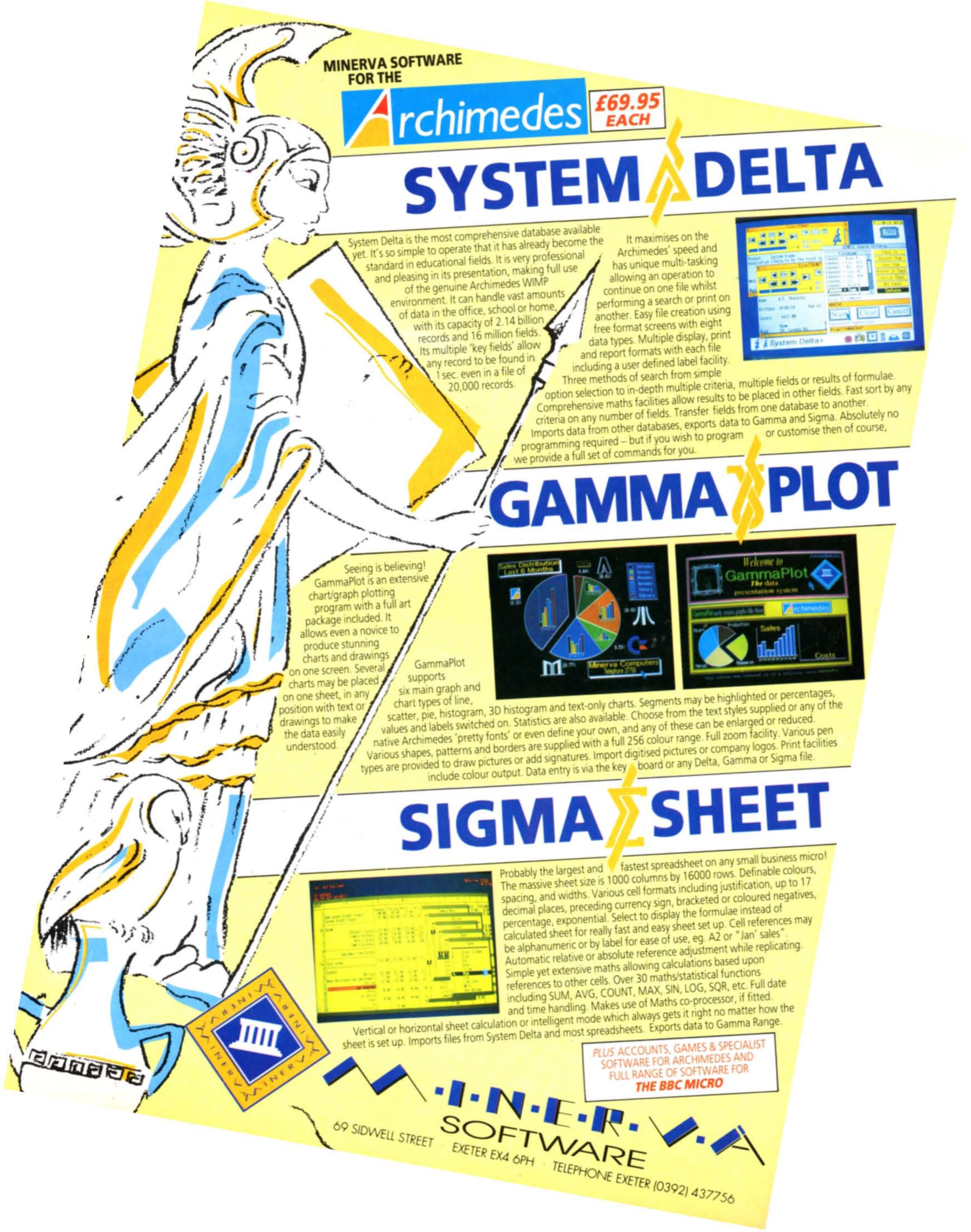

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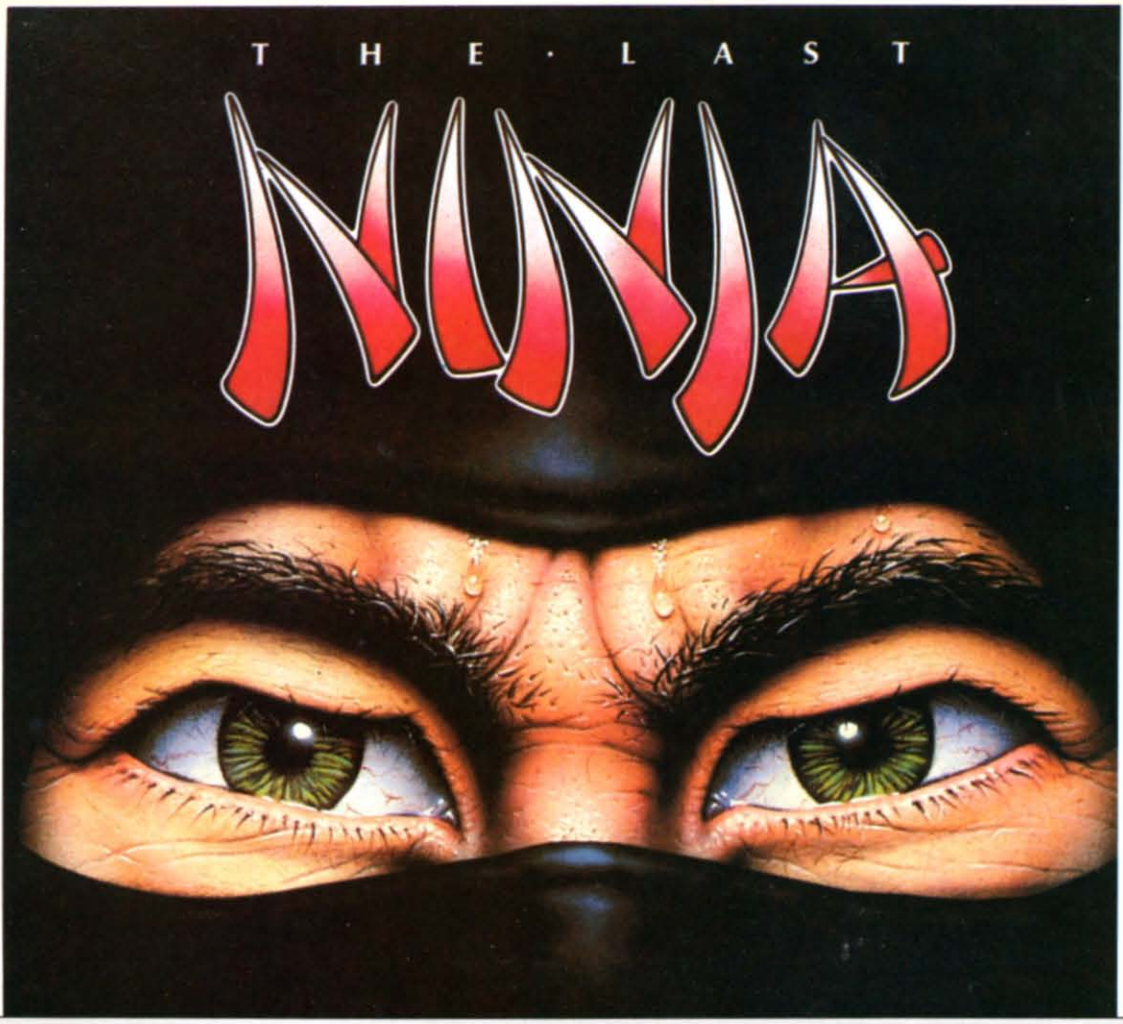

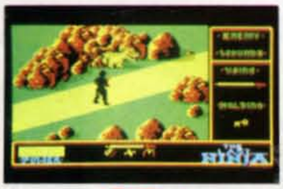
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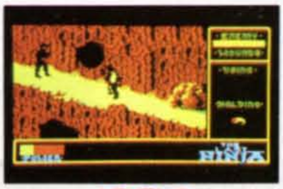
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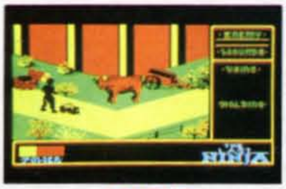
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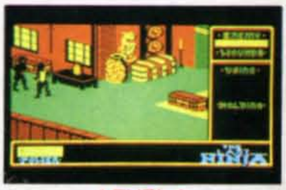
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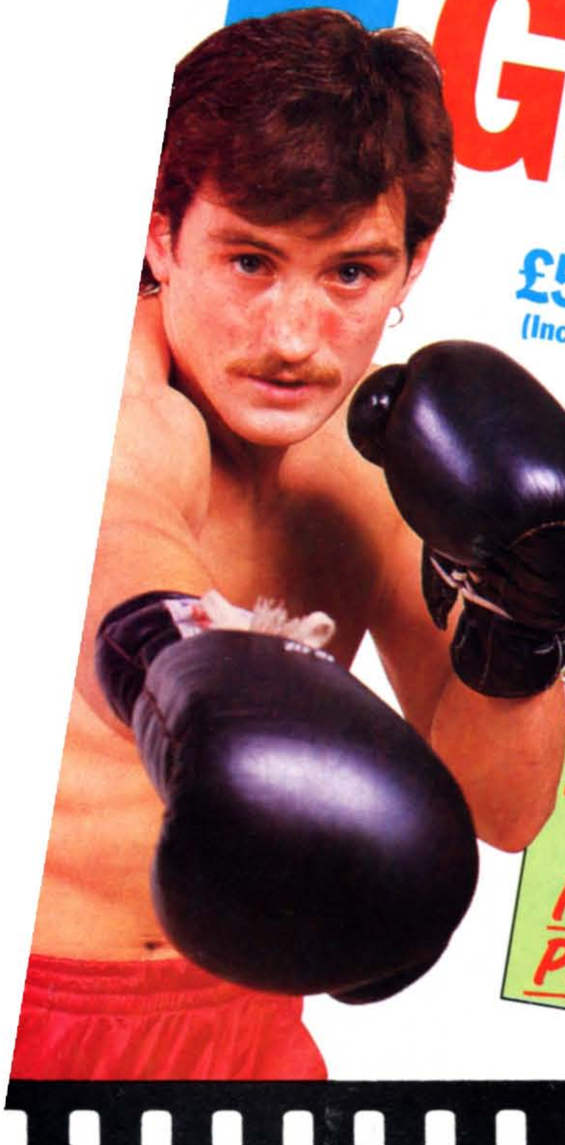

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BBC Micro Cassette £9.95

This is your opportunity to see not only a professional boxing match, but one in which Barry McGuigan will be challenging for the World Super Featherweight Title.

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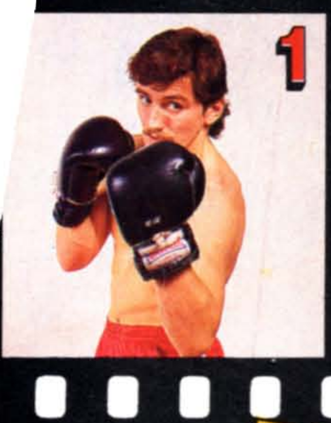
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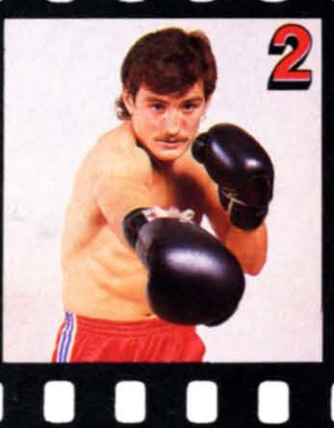
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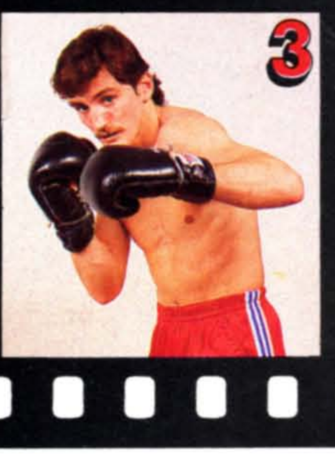
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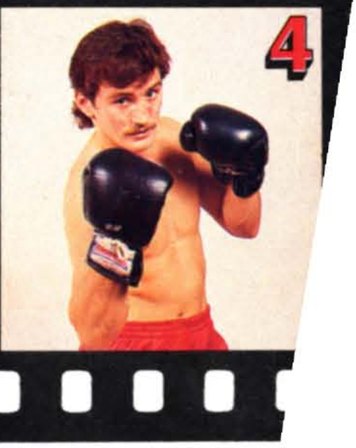

4

THE ANSWERS

A. Right Punch
B. Left Punch
C. Right Hook
D. Left Hook
E. Left Uppercut
F. Right Uppercut

RUNNERS UP PRIZES

The next 20 people with the correct answers can choose from the growing series of Play it Again Sam compilations. In addition to Superior titles these now include the best games from other software houses.

and match

WHAT YOU HAVE TO DO

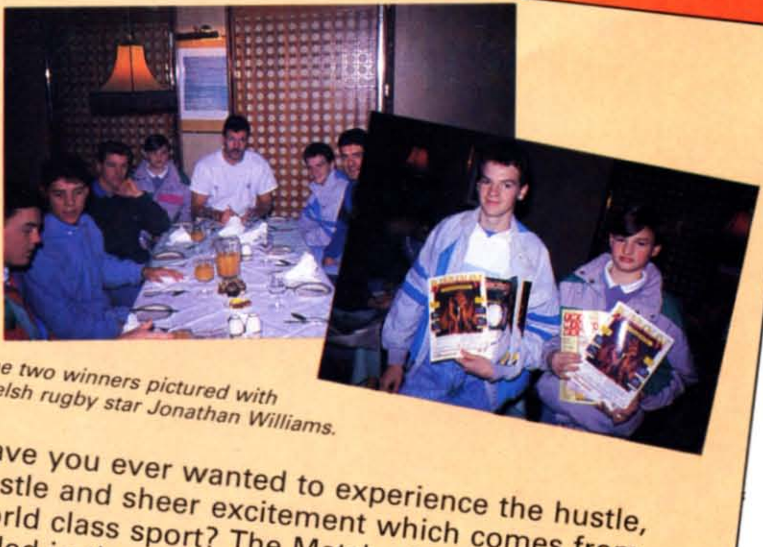
Not to be outdone by the rugby fraternity this is now the turn of supporters of the gentlemanly art of pugilism – boxing.

Below are five poses of classic boxing moves. All you have to do is match these with their correct terms. The first entries with the right answers will be the winners.

If you think that picture A is a Right Punch then mark an A in the first box in the entry coupon.

When you have completed all the boxes add your name, age, address and send it to us to arrive no later than February 1 1989.

Barbarian winners



The two winners pictured with Welsh rugby star Jonathan Williams.

Have you ever wanted to experience the hustle, bustle and sheer excitement which comes from world class sport? The Match of The Year it was called in the newspapers and on television. Do you wish you could have been there?

Thanks to Superior's Barbarian competition in the July issue of *The Micro User*, Mark Freeman from London and Richard Williams from Bury not only had a grandstand view but also met their heroes from the teams.

ENTRY FORM

1.	2.	3.	4.	5.
☐	☐	☐	☐	☐

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Now send to Game Set and Match, The Micro User, Europa House, Adlington Park, Adlington, Macclesfield SK10 4NP.

Russian with real character

Stovin Johnson makes his contribution to glasnost

LEARNING Russian can be a real problem especially if your handwriting in that language is unreadable even to yourself. So here's a utility that allows you to write Russian on a Mode 4 graphics screen, mix it with English and move between the two at will. And – for those who don't speak Russian – the techniques in this utility will enable you to display any character-based language.

Because the Cyrillic alphabet contains more characters than ours there are a lot to be defined. So when the program is run the character space is exploded and PAGE raised by seven memory pages – the program then re-CHAINs itself.

From the program's main menu you are presented with four options: You can view all the Russian characters by using *C*, press *E* to enter text, *F* gets text from a file and *Q* quits.

In edit mode you are presented with a green *tabula rasa* on which you to type black characters. You start in Russian mode, pressing f0 – *Print* on the Archimedes – switches to English and using it again returns you to Russian. Plus you can use four control keys to move about the screen:

Control+H	**Cursor left**
Control+I	**Cursor right**
Control+J	**Cursor down**
Control+K	**Cursor up**

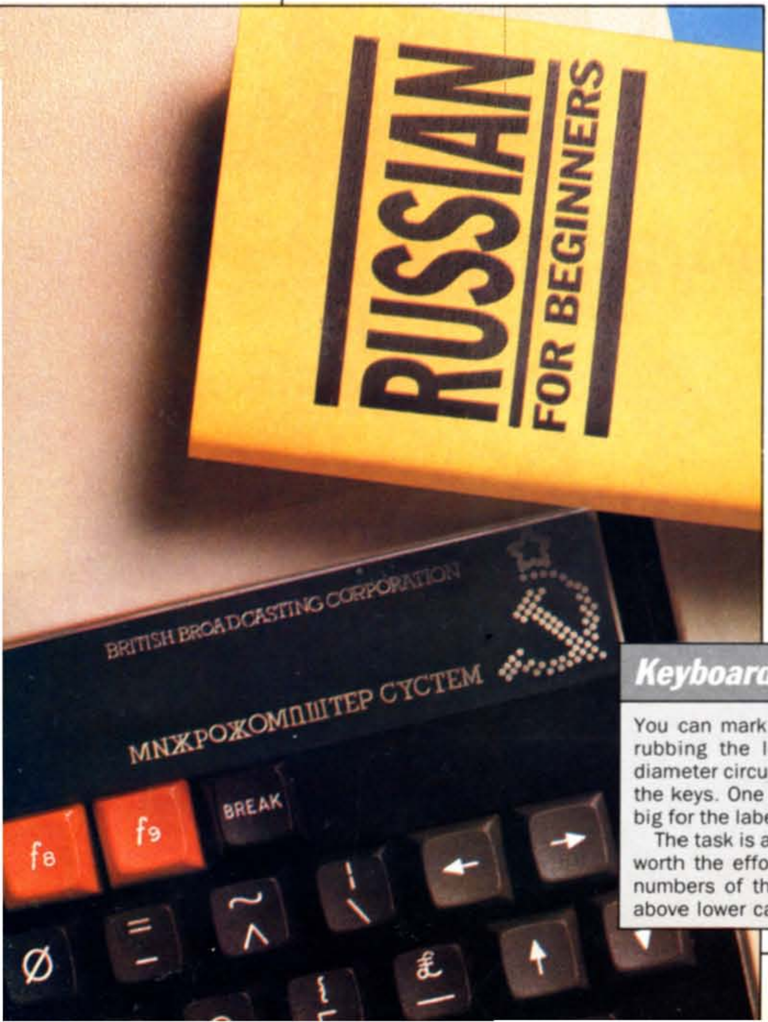
In addition Control+L will clear it. Delete and cursor copying all work correctly, but to copy combined English and Russian text you have to be in English mode – otherwise copied English text is converted to Russian.

Putting text on the screen is all very well, but we still need to save it: By pressing f1 you can grab the whole 10k screen under the auto-

The new character set

The definitions of the new characters are in PROCdefine and allocated to particular keys in PROCkeys. The key assignment data is represented by a pair of numbers: The first is the original key Ascii value and the second is the new value. The list is terminated by two zeroes.

So, for example, the first character (171) takes the place of + (43) the second (160) supplants – (45) and so on until the rest of the new character set has replaced the relevant parts of the old. Also some keys are kept but moved, for instance S becomes C.



Keyboard capers

You can mark the keys using Letraset – sheet number 3609 – by rubbing the legends on to number 8 Blick self-adhesive 7mm diameter circular labels then stick them on to the front facing side of the keys. One or two of the Letraset uppercase characters were too big for the labels but the equivalent lowercase are quite satisfactory.

The task is a bit fiddly – tweezers are useful – but the result is well worth the effort. The keyboard layout is shown in Figure I and the numbers of the definitions are given below each key, upper case above lower case.

incrementing filename S.FileNN. Alternatively pressing f9 creates a text file – the actual character values on each line are saved using the name R.FileNN, trailing spaces are omitted to save space. If you are using ADFS you'll need to create the R and S directories first. Pressing f2 or Escape returns you to the main menu.

If you have a text file on disc you can bring it on to the screen as if it was typed at the keyboard by selecting the *From file* option, enter the filename and it all happens automatically. Some text may get scrolled off the screen if the file is too long, you will then be able to modify and save the screen as before.

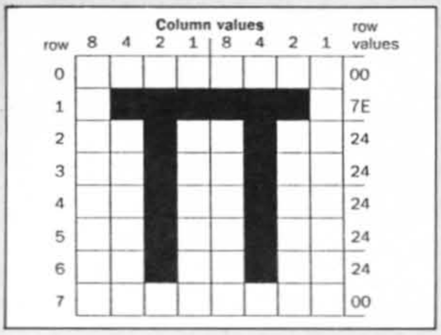
So type in the listing and save it as RUSKEYS, correct your typing errors using Get it Right! and save it again. When it's correct RUN it and Peeshet pa-rohsky yizlek!

For Master, Compact and Archimedes remove line 40 before running.

Creating your own character set

Implementing a different language using the Ruskeys program is a fairly simple, if lengthy, procedure. The first step is to design each of the new symbols. If you have a character definer this will be easy, but even by hand this can be done quickly.

As an example let's take the Greek letter pi shown in the grid: Block in the squares that need to be filled, then grouping each row in fours add up the column values and write the result down in hexadecimal – apart from 0 to 9 you only need to know 10 to 15, that is A to E.



Now you can write out your VDU23 statement to define, say, character 224. Take the rows a pair at a time and enter the hexadecimal values in the order high row then low. Place a semicolon after each because you're sending two bytes at a time rather than one, like this:

```
VDU23,224,&007E;&2424;&2424;&0024;
```

Repeat the design procedure for all the new characters giving each of them a different code number. You can use any number from 128 to 255, but make sure you always use continuous blocks of 32.

Once they are all finished you can replace lines 770 to 1400 in the program with the new definitions. Note that in those lines the values like 23,224 have been replaced with the shorter hexadecimal equivalent – 23 is &17 and 224 is &E0. The two numbers are combined in high/low byte order and followed by a semi-colon:

```
VDU&E017;...
```

The next step is to create the key replacement values which is even easier. Let's say you decide to make pressing unshifted p give the pi character. Lower case p has an Ascii value of 112 and we have given pi the character code of 224, so we can simply enter the pair of numbers:

```
DATA 112,224
```

after PROCkeytable at line 1460 but before the 0,0 in the final line.

Now when you run the program and have the alternate language switched in, pressing the lower case p will produce pi.

```
   10 REM Ruskeys
   20 REM by Stovin Johnson
   30 REM (C) The Micro User
   40 IF PAGE<&2000 THEN PAGE=&2000:CHAI
N"Ruskeys"
   50 PROCinit
   60 ON ERROR IF ERR=17 ELSEMODE7:PROCe
rror
   70 REPEAT MODE4:PROCmenu
   80 IF C%=1 PROCinput
   90 IF C%=2 PROCfromdisc
  100 IF C%=3 PROCseechrs
  110 UNTIL C%=4:PROCquit:END
  120 DEF PROCinput:CLS
  130 VDU19,0,2;0;19,1,0;0;
  140 LOCAL G%,Q%,R%:R%=TRUE
  150 REPEAT G%=GET:IFG%>=240PROCfunkey
  160 IFR%IFG%<127IFG%>32G%=table?G%
  170 IFG%>31VDUG%ELSEIFG%>7IFG%<14VDUG%
:IFG%=13VDU10
```

Turn to Page 25 ▶

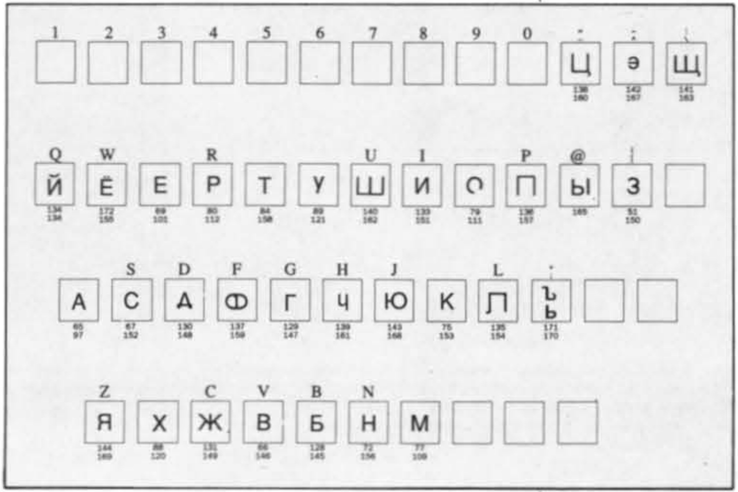


Figure I: The keyboard layout using the Russian character set

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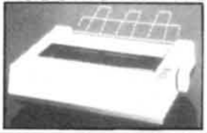

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◀ *From Page 23*

```
  180 UNTIL Q%:ENDPROC
  190 DEF PROCfunkey
  200 IF G%=240 R%=NOTR%
  210 IF G%=241 PROCsave
  220 IF G%=242 Q%=TRUE
  230 IF G%=249 PROCtodisc
  240 G%=0:ENDPROC
  250 DEF PROCfromdisc
  260 INPUT"File name",f$
  270 PROCos("EXEC "+f$)
  280 PROCinput:ENDPROC
  290 DEF PROCos($os%):LOCALX%,Y%
  300 X%=os%:Y%=os%DIV256
  310 CALL&FFF7:ENDPROC
  320 DEF PROCsave
  330 PROCos("SAVE S.File"+FNn(out)+" FF
FF5800 FFFF8000")
  340 ENDPROC
  350 DEF PROCtodisc:s$=STRING$(40,"!")
  360 Z%=OPENOUT("R.File"+FNn(out))
  370 FOR Y%=0 TO 30:s$="":F%=0
  380 FOR X%=39 TO 0 STEP-1
  390 B%=FNg(X%,Y%):IF F% s$=CHR$B%+s$ E
LSEIF B%<>32 s$=CHR$B%+s$:F%=TRUE
  400 NEXT:PROCsend(s$):NEXT
  410 CLOSE#Z%:out=out+1:ENDPROC
  420 DEF FNn(N%)
  430 =STR$(N%DIV256)+STR$(N%MOD256)
  440 DEF FNg(X%,Y%)
  450 VDU31X%Y%:LOCAL A%:A%=135
  460 =(USR(&FFF4)AND&FF00)DIV&100
  470 DEF PROCsend(s$)
  480 IF s$="" BPUT#Z%,13:ENDPROC
  490 FOR L%=1 TO LENs$
  500 BPUT#Z%,ASCMID$(s$,L%)
  510 NEXT:BPUT#Z%,13:ENDPROC
  520 DEFPROCseechrs:CLS
  530 PRINT:PRINT'SPC4;
  540 FOR I%=32 TO 126:C%=table?I%
  550 IF C%<>I% VDU32,32,C%
  560 IF POS>30 PRINT:PRINT'SPC4;
  570 NEXT:PRINT''TAB(12)"Press space"
  580 REPEAT UNTIL GET=32:ENDPROC
  590 DEFPROCmenu:CLS
  600 PRINTTAB(15,4)"OPTIONS"
  610 PRINT'TAB(11)"E)nter text"
  620 PRINT'TAB(11)"F)rom disc"
  630 PRINT'TAB(11)"C)haracters"
  640 PRINT'TAB(11)"Q)uit"
  650 PRINT'TAB(11)"Select your choice";
  660 REPEAT G%=GETAND&DF
  670 C%=INSTR("EFCQ",CHR$G%)
  680 UNTIL C%>0:ENDPROC
  690 DEF PROCquit:*FX225,1
  700 CLOSE#0:VDU3,4:PRINT':ENDPROC
  710 DEF PROCerror:PROCquit:REPORT
  720 PRINT" at line ";ERL:ENDPROC
  730 DEF PROCinit:*FX20,1
  740 DIM os%&100:PROCdefine:*FX225,240
  750 PROCkeytable:out=0:ENDPROC
  760 DEF PROCdefine
  770 VDU&8017;&6C7C;&7C60;&6666;&7C;
  780 VDU&8117;&667E;&6060;&6060;&60;
  790 VDU&8217;&163E;&2626;&7F46;&42;
  800 VDU&8317;&4949;&1C2A;&492A;&49;
  810 VDU&8417;&4400;&7444;&4C4C;&74;
  820 VDU&8517;&6666;&7E6E;&6676;&66;
  830 VDU&8617;&836;&6763;&7B6F;&73;
  840 VDU&8717;&263E;&2626;&6626;&66;
  850 VDU&8817;&66FF;&6666;&6666;&66;
  860 VDU&8917;&3C18;&5A5A;&3C5A;&18;
```

```
 870 VDU&8A17;&6666;&6666;&7E66;&F;
 880 VDU&8B17;&6666;&3E66;&606;6;
 890 VDU&8C17;&6B6B;&6B6B;&6B6B;&7F;
 900 VDU&8D17;&6B6B;&6B6B;&6B6B;&F7F;
 910 VDU&8E17;&6C38;&3E06;&6C06;&38;
 920 VDU&8F17;&DECC;&F3F3;&DEF3;&CC;
 930 VDU&9017;&663E;&3E66;&6636;&66;
 940 VDU&9117;&3C00;&5C40;&4464;&38;
 950 VDU&9217;0;&667C;&667C;&7C;
 960 VDU&9317;0;&727E;&6060;&60;
 970 VDU&9417;0;&163E;&2616;&427E;
 980 VDU&9517;0;&1A6B;&2B1E;&49;
 990 VDU&9617;0;&61C;&60C;&1C;
1000 VDU&9717;0;&6E66;&767E;&66;
1010 VDU&9817;0;&623C;&6040;&3E;
1020 VDU&9917;0;&6C66;&6C78;&66;
1030 VDU&9A17;0;&361E;&3636;&66;
1040 VDU&9B17;&66;&623C;&607E;&3E;
1050 VDU&9C17;0;&6666;&667E;&66;
1060 VDU&9D17;0;&66FF;&6666;&66;
1070 VDU&9E17;0;&187E;&1818;&18;
1080 VDU&9F17;&1800;&DB7E;&7EDB;&18;
1090 VDU&A017;0;&3636;&3636;&73F;
1100 VDU&A117;0;&6666;&63E;6;
1110 VDU&A217;0;&2A2A;&2A2A;&3E;
1120 VDU&A317;0;&2A2A;&2A2A;&73F;
1130 VDU&A417;0;&1070;&161C;&1C;
1140 VDU&A517;0;&6363;&6F7B;&3B;
1150 VDU&A617;0;&3030;&363C;&1C;
1160 VDU&A717;0;&63C;&61E;&3C;
1170 VDU&A817;0;&524C;&5272;&4C;
1180 VDU&A917;0;&361E;&361E;&66;
1190 VDU&AA17;&1000;&1C10;&1212;&1C;
1200 VDU&AB17;&7000;&1C10;&1212;&1C;
1210 VDU&AC17;&66;&627E;&6278;&7E;
1220 VDU&AD17;&3225;&3035;&D;&1E50;
1230 VDU&AE17;&20F4;&5845;&4C50;&444F;
1240 VDU&AF17;&2045;&4843;&5241;&4341;
```

```
1250 VDU&B017;&4554;&5352;&5320;&4150;
1260 VDU&B117;&4543;&D;&C5A;&462A;
1270 VDU&B217;&2058;&3032;&312C;&D;
1280 VDU&B317;&F64;&462A;&2058;&3232;
1290 VDU&B417;&2C35;&3731;&D35;&6E00;
1300 VDU&B517;&F418;&5220;&5355;&4953;
1310 VDU&B617;&4E41;&4320;&4148;&4152;
1320 VDU&B717;&5443;&5245;&D53;&7800;
1330 VDU&B817;&F410;&5520;&5050;&5245;
1340 VDU&B917;&4320;&5341;&D45;&8200;
1350 VDU&BA17;&EF29;&3220;&2C33;&3231;
1360 VDU&BB17;&2C38;&3231;&2C34;&3031;
1370 VDU&BC17;&2C38;&3639;&312C;&3432;
1380 VDU&BD17;&312C;&3230;&312C;&3230;
1390 VDU&BE17;&312C;&3432;&302C;&D;
1400 VDU&BF17;&258C;&20EF;&3332;&312C;
1410 ENDPROC
1420 DEF PROCkeytable:DIM table &100
1430 FOR I%=0 TO 255:table?I%=I%:NEXT
1440 REPEATREADI%,J%:IFI%>0table?I%=J%
1450 UNTIL I%=0:ENDPROC
1460 DATA 43,171,45,160,59,170
1470 DATA 61,138,64,132,66,128
1480 DATA 67,131,68,130,70,137
1490 DATA 71,129,72,139,73,133
1500 DATA 74,143,76,135,78,72
1510 DATA 80,136,81,134,82,80
1520 DATA 83,67,85,140,86,66
1530 DATA 87,172,90,144,91,150
1540 DATA 92,163,94,167,98,145
1550 DATA 99,149,100,148,102,159
1560 DATA 103,147,104,161,105,151
1570 DATA 106,168,107,153,108,154
1580 DATA 110,156,112,157,113,134
1590 DATA 114,112,115,152,116,158
1600 DATA 117,162,118,146,119,155
1610 DATA 122,169,123,51,124,141
1620 DATA 126,142,0,0
```

Get it right!

```
  10 =    0 0 |  280 = 6569 3 |  550 = 6EE5 E |  820 = 5C48 3 | 1090 = 8FEA 2 | 1360 = 6D32 5
  20 =    0 0 |  290 = 232E 5 |  560 = 55F6 0 |  830 = A50E 9 | 1100 = 16A0 F | 1370 = F8C8 5
  30 =    0 0 |  300 = 6677 3 |  570 = AA3E D |  840 = 2C92 E | 1110 = 5FE1 4 | 1380 = DC0F 2
  40 = 73A7 7 |  310 = 4C80 8 |  580 = BF3A C |  850 = 55F8 B | 1120 = 7675 6 | 1390 = 2553 E
  50 = DEBB 4 |  320 =  EB7 F |  590 = 5C12 C |  860 = D2CF F | 1130 = C18C B | 1400 = 14D1 2
  60 = 69DE B |  330 = E8AC C |  600 = 6E54 3 |  870 = A3BC 9 | 1140 = A1EF 8 | 1410 = ED0F 0
  70 = A467 B |  340 = ED0F 2 |  610 =  6A4 A |  880 = 426C 5 | 1150 = F4CC 5 | 1420 = 3D32 5
  80 = 2549 0 |  350 = 1CF4 1 |  620 = B702 2 |  890 = D663 C | 1160 = 272C 8 | 1430 = 7752 5
  90 = D828 0 |  360 = 8D90 6 |  630 = B5E4 1 |  900 = 804D F | 1170 = C2FF A | 1440 = 46EB 4
 100 = F41D C |  370 = 3755 9 |  640 = 23B3 B |  910 = 407C 4 | 1180 = 2FC8 B | 1450 = AB95 0
 110 = CEF3 A |  380 = 94BD 7 |  650 = 70B8 8 |  920 = 76CE 6 | 1190 = 323C E | 1460 = 9C3B 7
 120 = DF0F 8 |  390 = D599 A |  660 = 1008 7 |  930 = C51F 6 | 1200 =  AC8 A | 1470 = F614 A
 130 = 4555 D |  400 = 374C F |  670 = 9C61 1 |  940 = 99D0 5 | 1210 = 1DD1 A | 1480 = 488C 8
 140 = 8873 5 |  410 = 91AC 7 |  680 = B64B D |  950 = 64F5 3 | 1220 = A5A4 E | 1490 = B920 F
 150 = A4A5 B |  420 = C7F3 2 |  690 = A87C 4 |  960 = 88A6 B | 1230 = CDCC 0 | 1500 = 7D5D B
 160 = 47E2 B |  430 = 5126 4 |  700 = F9BB C |  970 =  12B D | 1240 = A915 7 | 1510 = 6699 3
 170 = 1893 1 |  440 = 1BDB F |  710 = 61C4 5 |  980 = FA54 F | 1250 = BF4E 2 | 1520 = 5C51 6
 180 = BEA3 E |  450 = 4A7D C |  720 = 7580 3 |  990 = 18E3 1 | 1260 = 1EAB 8 | 1530 = BFE7 9
 190 = BEEE F |  460 = 2462 5 |  730 = 75D1 F | 1000 = 3A64 F | 1270 = E4A6 0 | 1540 = D2A2 B
 200 =   20 6 |  470 = E9D8 D |  740 = FA05 6 | 1010 = BCBD 1 | 1280 = 6562 A | 1550 = 1863 F
 210 = 5054 1 |  480 = 8B58 A |  750 = C89C 9 | 1020 =  B1F 6 | 1290 =  D2E A | 1560 = 3635 3
 220 = 8C5F 7 |  490 = 3610 E |  760 = D510 B | 1030 = 113C 8 | 1300 = 3C3C D | 1570 = 4857 D
 230 = B8B9 1 |  500 = B70E 5 |  770 = 59B5 B | 1040 = 3246 B | 1310 = EA4A A | 1580 = 886E E
 240 = 5E29 E |  510 = 2F20 7 |  780 = 221F 4 | 1050 = 8993 6 | 1320 = 558B C | 1590 = 9943 6
 250 = 849B D |  520 = EBDD F |  790 = 27A0 B | 1060 = 4E1B D | 1330 = BBF6 7 | 1600 =  BC7 5
 260 = 3DD5 B |  530 = 26B1 8 |  800 = E651 9 | 1070 = 8A6A 3 | 1340 = E7F6 C | 1610 = EA37 5
 270 = 3457 9 |  540 = A380 2 |  810 = 731B A | 1080 = 61B0 8 | 1350 = 6FED 6 | 1620 = 4174 8
```

B B+ M

But which Elite is yours?

The Mad Hatter flies off bounty hunting

THE volume of mail I have received about various aspects of *Elite* has been amazing. It seems one thing that needs clarifying relates to the various versions of the game in circulation. Essentially, there are three – each with its own special characteristics. First, there is the tape version that has to reside totally in the memory of your BBC Micro, and therefore is very limited.

You cannot take part in either of the missions, there's no access to military or mining lasers, the number of ships encountered is restricted and when you have a docking computer it takes you instantaneously to the space station. This is the version I had at first and it is fun to play despite its limitations.

Next there is the ordinary disc version, which was released at the same time as the tape. Because the disc can be accessed regularly there are more types of enemy ship, play is a little faster and – most important – you can participate in the two missions. The docking computer doesn't give instantaneous entry to the space station.

One feature of this version becomes apparent when you are engaged in bounty hunting – alloys predominate. Thus on three such trips I collected 12 tons of alloys out of a total of 22 tons of booty, 14 out of 35 tons and 16 out of 33 tons.

Finally, there is version two of Elite – the combined Acornsoft and Superior Software disc – which is the one I usually refer to. This caters for the BBC B (40 track) on side one and the other allows for BBC B, B+, Master and 6502 second processors on 80 track.

All have slightly different characteristics, most notably the way the energy bomb effect is displayed. There is more use of colour on version two and when a co-processor is used the increase in speed is tremendous. It is this version that has things like generation ships and space dredgers in the higher memory configurations. I hope this helps to clarify matters.

A final thought for this month on tactics, since many of you have taken fresh encouragement from the hints and tips given over the past few months: Be patient and don't be greedy. I usually have to confine myself to playing sessions lasting about an hour, which is about long enough to destroy half the number of pirates required for a *Right on Commander!*

If I am getting hard pressed, with energy banks depleted I don't hesitate to hyperspace out of danger – using the energy bomb at the last second if needed. You'll still have plenty of combat opportunity when doing a trading run back to Biabete.

See you next month. Until then, happy hunting and happy adventuring.

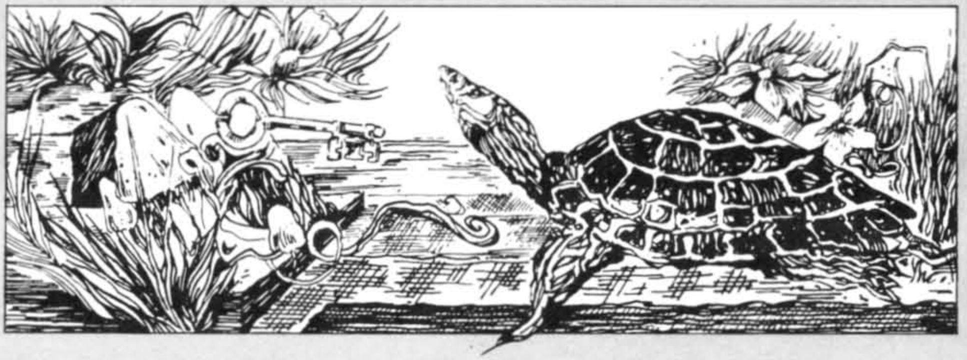
No strings attached

The third and final stage of Geoff Larsen's **Puppet Man** involves satisfying Erato and confronting the Puppeteer himself. Go to the stage and talk to the juggler, Pierrot. Take the indian club and jump. Go to the house and then up, N, get the glove and examine the shelf. Take the note, retrace your steps and go to the crossroads.

From there move S, S, W and S. Here, sooner or later, a man in the bushes creates a path leading west. Move around till you hear him and then you can continue. Go W, W, W and drop the club then S, S, W, S and E. Examine the fire, wear the glove and take the poker.

Next go W, N, W and examine the fire, then poke the cinders to reveal the black key which, you take. Now move E, S, E and light the candle so that you can proceed W, N, N and up. Go to the door, unlock the desk, examine it and get the poem, now you must retrace your steps to the stage and give it to Columbine.

For the last moves, jump and go W, N, N, N, examine the stump and get the marionette. Now go to the village inn – east from the green – and give the marionette to the Puppet Man.



L's a'poppin'

The second part of Bill Hensman's solution to **L** begins at the maze: Move N, E, E and S to find the sphere. As it is only a location marker you can safely ignore it and continue E, E, N and N to a staircase. Now climb up to the courtyard to meet the turtle.

You cannot approach the turtle directly since he always takes two steps to your one in the same direction. Bill's answer is to move S repeatedly until he is level with you and then do the same thing moving W.

When you finally meet, the turtle hands over a rusty key which will be needed later. Now go back down to the maze and retrace your steps to the telephone room. From here go W to the corridor and then S, S to the end and then E into the creeper room. Later in the game a rope ladder will be found here. Meanwhile, enter N and you are back at the workshop where you should now take the tetrahedron.

Proceed E to the kitchen and N to the L-shaped room then W to the pantry. Get the cube and go back to the L-shaped room and then go E to a boiler room.

- *More next month...*

On the road to success

Dungeon adventure: *The Final Solution*

Let's take a look at Stuart Booth's treatment of the ramp area – you can compare it with my own solution in the October 1987 issue of *The Micro User*. First, go to the salt cellar and take the pig. Whatever you do, don't LOOK in this room – remember what happened to Lot's wife. Next you should go E and climb the ramp to the first doorway then go E, U and E. Take the topaz and move W, W to get out.

Climb the ramp to the third doorway – with the ornate entrance – go in and PUSH the statue to reveal a hole: A second PUSH will close it. Take the rhinestone from this concealed room and leave.

Now go back down the ramp to the bottom, N and then D again to the new doorway. Go in and push button nine in the skinner box and then button four in the reward room. Next climb the ramp to the square doorway, go in and take the box. After that you should go back down and then S along the ladder to the ramp with the shallow water. Drop the pig and the box here, take the pearl, open the box to get the opal and leave the box.

Store the chest, ore, opal, pearl, rhinestone, sapphire, topaz and spices in the packing case and climb back up the ramp to the rubbery doorway. Enter and take the emerald from the black glass room.

Now you must be brave. Continue up until you hear the bouncing boulder, climb up one more move, enter the doorway and leave once the boulder has passed and carry on up to the dark doorway. Go in to trigger the black sphere and then leave and carry on all the way up to the room with the sanity-sapping images on the wall. Close your eyes here and move N where another black sphere awaits. Open your eyes after the mutual destruction and take the diamond and shield.

Go S now, close your eyes again, move D and then open your eyes once more. Carry on down to the doorway with the holes, enter and examine the corpse. Take the blindfold, wear the gauntlet and leave.

Next climb back up to the red gold room, enter

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> Be patient and don't be greedy

◀ *From Page 27*

and you will find you can now take the ring safely. Descend to the dark doorway and take the wedge from inside. Go down to the doorway with scratches, because you can now enter safely when you hear the boulder.

At the message *The walls at the far end clash together* throw the wedge. When the bars lift, go W and then into the treasure room for the agate. Next go down to the room with the hand sign, throw the ring, enter and collect the ruby. You must now go D to the acrid-smelling doorway, wear the blindfold and enter. Take the brooch and leave. Lastly descend to the pale room, go in and throw the brooch at the executioner; ignore the hood but take the amethyst.

Either go to the black pedestal and enter GREEN, or leave through the signposted doorway carrying nine of the gems. Make sure you have the cross and crucifix before leaving the exit chamber.

Finally make sure you have either the horn or the teeth from the packing case. Go outside and, as the Orcs are encountered, either blow the horn or plant the teeth. Remember Cadamanthus? Then amble east along the forest road to civilisation in order to win.

As Stuart says, it's simple – when you know how.

Valley of the Kings

> *‘Win friends and influence people. Is how to get ahead in the Twin Kingdom Valley’*

Kings are traditionally good friends but powerful enemies, and this holds good in Twin Kingdom Valley. So, for our second look at this adventure, we'll concentrate on winning friends and influencing people.

Last month I left you beside Watersmeet after bathing in and drinking the magical waters. Now it is time to go underground and equip yourself a little more completely. Enter the cave near Watersmeet, switch on the lamp and move W, N and E. Return by going SW, taking the holdall and moving E then S.

You can put many extra items in the holdall, enabling you to carry a great deal more than before. Stuart Booth utters a caveat in his notes: Never put a lit lamp in the holdall, or attempt to light the lamp while it is in there. I can't say that I ever did – but if you want to see why Stuart utters his warning, do remember to SAVE first – and remember that the process takes quite a long time.

Put the jug and brass key into the holdall, then take the diamond and collect the gold key from the kitchen. Go to the passage beside the gold door open it and go S to the cave at the top of the shaft and open the door here – this time a metal one. The keys are graded in a hierarchy that allows you to open lesser doors. The master key, when you find it, allows you to open every door.

Now it is time to enter the Hall of the Forest King. There you give the guard the diamond as a token of your esteem – fret not, you haven't lost it forever – in return you are given an amulet which serves as a means of identification, showing that you are now the King's ally.

Return to the cave system now and collect the short wooden rod and the crystal ball. Into the twisty maze you go, moving N, E, W to meet the witch. In exchange for the crystal ball she will give you the bronze key.

Now you must go W, W, W, S and finally up through the Hall of the Forest King, through the metal door to the bronze door. Open it, enter and close the door again. This traps the dwarf inside enabling you to kill him so that you can take the ring and the bag of gold from his corpse. Wear the amulet and put the rod, bronze key and any spare weapons into the holdall. Return to the cabin and there deposit the gold key, ring and the bag of gold.

- *Next month we'll continue our solution of Twin Kingdom Valley.*

Whizzkids

Nic Outterside examines the development of Heyley Software

THERE can be few adventure software houses supplying the BBC Micro market that have enjoyed the kind of startling growth and success that has been the fortune of Heyley Software during the past year.

Behind every success there is a story and the one at Heyley is remarkable. What began as the hobby of two schoolboys has developed into a respected software house producing some of the most original and addictive adventures available.

Howard Robert's first encounter with a micro was with a ZX81 in 1982 and despite the lack of anything approaching computer studies at school and with a ZX81 plagued by a wobbling ram pack he soon taught himself Basic programming.

Meanwhile, a street away, Tony Heap was getting to grips with an HP85 and soon experienced the delights of an early text adventure called **Gnome**.

Both boys became addicted and were determined to buy the best – a BBC Model B. Tony saved furiously and by early 1983 had bought one with monitor and disc drive. Back in Ley Hey Road, Howard, forked out £335 for his machine, opening the door to the world of text adventures.

A few months later Howard happened upon an early Level 9 advertisement and ordered a copy of **Colossal Adventure** and soon ordered more games including his all-time favourite, **Lords of Time**.

After reading an article by Pete Austin outlining the Level 9 writing system and how to write good adventures Howard became hooked.

Tony had – by an equal stroke of luck – discovered that graphical stunner **Twin Kingdom Valley** and was shortly making inroads into **Sphinx Adventure** and **Castle of Riddles**. For both boys these early experiences were to shape their writing method for the future.

Christmas 1985 found a heavily Level 9 influenced 18-year-old scribing a 254 location text epic titled **The Ultimate Prize**. Howard admits that **Colossal Adventure** and the Jackson and Livingstone Fighting Fantasy books were in the forefront of his thoughts as the first Heyley adventure took shape. This period was also to provide the meeting with Tony Heap which was soon to be forged into an inseparable writing partnership.

Howard's father loaned them £120 to gamble on a quarter page advertisement and they were rewarded by 15 orders, which just covered the advertising costs. More importantly, reviewers and adventurers were introduced to the name Heyley – a name which was to appear again and again in the micro press during the next two years.

By early 1987 orders for their games were trickling in, but with the likes of Level 9 and Epic controlling the BBC Micro adventure market, success was limited. Then with the release of Tony Heap's **Dreamtime**, BBC Micro adventurers really began to take notice. Tony had worked hard on this multi-levelled jaunt which featured a space level which reeked of Douglas Adams' excellent Hitchikers' Guide to the Galaxy.

The Mad Hatter along with *Electron User's* Pendragon heartedly applauded this latest Heyley release and both warmed to the sense of humour which pervades all the Heyley games.

As Tony began to learn machine code programming he brought more influence to bear on the coding of the ensuing Heyley adventures. **The Taroda Scheme** became a joint family effort with everyone chipping in an idea or puzzle. The overall concept came from Tony's father during

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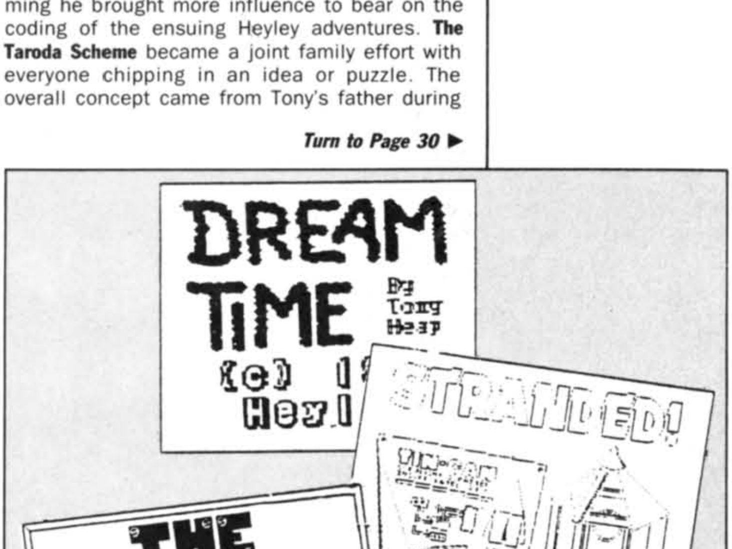

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> Meanwhile Tony's ideas were propagating during lessons at school

evening tea from which sprang five pages of pencilled notes.

Meanwhile Tony's ideas were propagating during lessons at school – Macbeth provided the inspiration for a puzzle in **Stranded!**. Nowadays they both keep a pad with them at all times, as Howard commented "You never know when a brilliant idea might come to you".

The launch of the Archimedes in late 1987 provided sufficient temptation for Heyley to order one of these mega machines. They were soon writing the first commercial adventure for it entitled **Stranded!** and this received immediate critical acclaim.

Thanks to favourable reviews of their first four adventures Howard and Tony were seeing a part-time hobby developing into a small profitable business. However, in March 1988 they made their second successful gamble when they paid £500 for a stand at the Manchester Electron and Micro User Show.

Howard tells the story of their breakthrough: "We set up our stand with our five games – including **Stranded!** – alongside a stock of other companies' adventures which we had negotiated to sell.

"Friday was terrible, we only sold three games all day and were seriously thinking of packing up and going home. But on Saturday and Sunday hundreds of customers flooded our stand and we were really in the public eye, selling our own games alongside established Level 9 adventures." Orders started to flood in and now Heyley was being mentioned in the same breath as giants like Infocom and Level 9.

The show also gave Tony and Howard the chance to establish important contacts with people such as Geoff Larsen of Larsoft and Dave Hitchins of Pres. Following the show, Heyley were to tie-up a deal with a major adventure publishing company to write a full graphic adventure for the Archimedes entitled **Rising Crime** with 60,000 words of text, 35k of puzzle data and a vocabulary of over 600 words – it's absolutely staggering with some of the best adventure graphics I have seen on any micro.

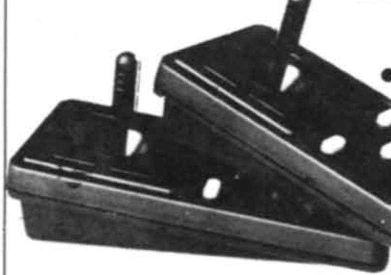
What of the future? Both Howard and Tony have grown with their adventures, offering different skills and freely criticise each other in attempts to produce the ultimate adventure which will perhaps provide their ultimate prize. Tony is currently working on his own machine code adventure writing system with a full multi-sentence parser and hopes to utilise it for a supernatural-based adventure for the new year.

Howard and Tony have youth on their side, experience under their belt and – Heyley promises to be with us for many years to come.

VOLTMACE

Archimedes COMPATIBLE

M COMPATIBLE



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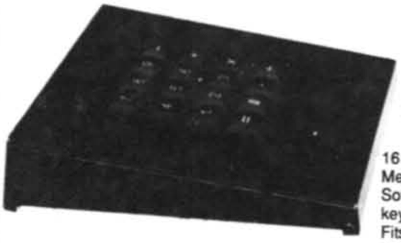

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Gnome Ranger ... graphic delight

Price £9.95 (80 track disc) for Master and enhanced BBC B.
Supplier: Level 9, PO Box 39, Weston-super-Mare, Avon BS24 9UR.
Tel: 0934 814450

IT came as a considerable shock to discover that until recently I had been living a sadly deprived existence. I first realised this when I reviewed Time and Magik, and this suspicion was reinforced as I became entranced with Lancelot – I had been suffering from a lack of Level 9. Final proof was supplied with Gnome Ranger – an outrageous exercise tinged with the usual Austin humour.

The positive reaction to Time and Magik encouraged the Austins to re-enter the BBC Micro market. We must ensure that they never leave it again, I had quite forgotten just how funny they could be.

Ingrid Bottomlow, a fetchingly Ramboesque picture of hirsute feminine charm, comes home from the Institute of Gnome Economics. Life down on the farm is transformed, as described most touchingly in The Gnettlefield Journal – a 48 page booklet supplied with the game.

At the end of this hilarious saga her desperate family consult a leprechaun and Ingrid is teleported into the wide blue yonder. Undaunted, she sets about returning home, helping distressed entities on the way. And so the game itself starts.

I often say that I am a text-only fan where adventures are concerned, but the standard of illustrations in Gnome Ranger is little short of superb and my resistance to adventures containing pictures is crumbling rapidly as a result.

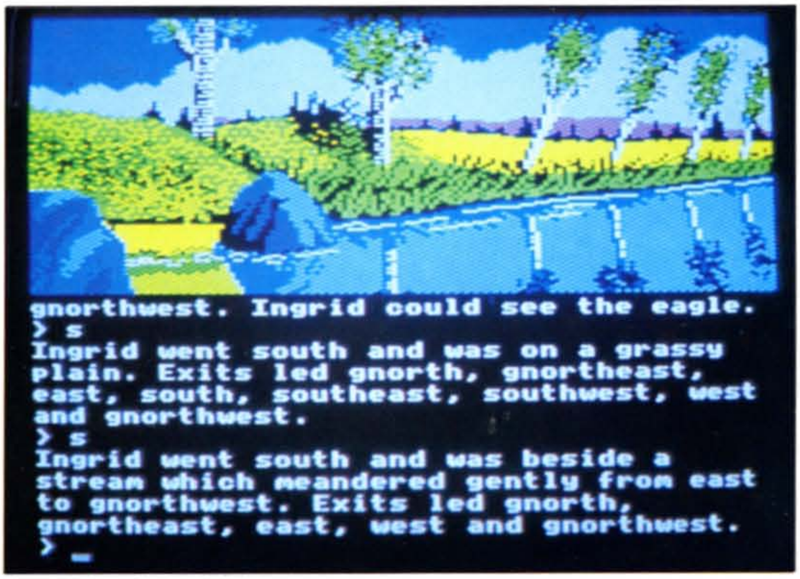
The text quality is, naturally, superlative. Once again I must use some of my precious word allowance to illustrate because those who have not come across adventures of this quality may find it hard to believe. So, there follow two typical snatches from the first part of this three part offering:

> *The centaur introduced himself: "Hello, my little rosebud. I am Capricorn Centaur, humble proprietor of this multifarious emporium. You may take anything your heart desires from this infinite variety by first giving me two other items in exchange".*

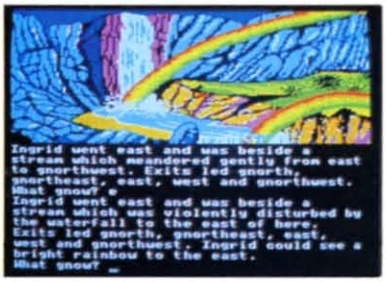
To my mind this is far superior to merely being told that you can obtain items by barter. Similarly, how about this – as Ingrid encounters a Caledonian eagle:

> *She took up Ingrid carefully in her talons and carried her down to the base of the pinnacle. Before flying off she dropped a small silver bell into Ingrid's hands. "If ye need any help, my dear, just give a wee ring on this and I'll be with ye before ye can say porridge".*

Inevitably, I had to ring the bell – and then enter *Say porridge* – simply to see what happened: *I don't think the eagle was being quite that literal* was the response.



```
gnorthwest. Ingrid could see the eagle.
> s
Ingrid went south and was on a grassy
plain. Exits led gnorth, gnortheast,
east, south, southeast, southwest, west
and gnorthwest.
> s
Ingrid went south and was beside a
stream which meandered gently from east
to gnorthwest. Exits led gnorth,
gnortheast, east, west and gnorthwest.
> _
```



```
Ingrid went east and was beside a
stream which meandered gently from east
to gnorthwest. Exits led gnorth,
gnortheast, east, west and gnorthwest.
What gnow? e
Ingrid went east and was beside a
stream which was violently disturbed by
the waterfall to the east of here.
Exits led gnorth, gnortheast, east,
west and gnorthwest. Ingrid could see a
bright rainbow to the east.
What gnow? _
```

Two superb pictures from Ingrid's exploits

Part one of the adventure consists of a lovely long chaining puzzle. The ultimate task is to defeat a wicked witch and to achieve this a team of helpers must be recruited and put to work. This is not as easy as it looks but – as always – there are plenty of places to explore as you find your way around and begin to work out a plan of campaign.

Newcomers to adventuring should notice the importance of the WAIT command at various points in the game. For example, there is the need to coax a very shy nymph into doing your bidding, and patience is essential as you go about this – she won't come charging up to you from the depths of her leafy glade.

There is an interesting variant on the maze principle – go to the marsh area carrying anything and a mist envelopes you. One way out is to drop everything – which doesn't help your progress much – but you still need to figure out another way to extricate yourself and still retain your possessions.

The high level commands mentioned when I reviewed Lancelot are available in Gnome Ranger and this is a great aid to later stages of the game. You should not, however, imagine that map making is now redundant – their greatest help comes after this.

The best way to use these commands is to explore everywhere painstakingly and thoroughly then work out what tasks need to be done. Now – having made notes – use the high level commands to work your way through each section of the adventure as economically as possible. The two most useful instructions – to my mind, at any rate – are GO TO location and FOLLOW entity. The latter clarifies matters most helpfully at times.

As always, a comprehensive hint sheet is available and a glance through it had me in stitches: It's almost as much a work of art as the game itself.

Mad Hatter

Presentation	9
Atmosphere	9
Graphics	9
Value for money	10
Overall	9

Star Fleet 1 ... reflective planning and hectic activity

Price: £24.95 (disc)
Requirements: Archimedes with PC Emulator
Supplier: Interstel/Electronic Arts, Langley Business Centre, 11/49 Station Road, Langley, Slough, Berkshire SL3 8YN.
Tel: 0753 49442

IT is hard to classify Star Fleet 1, a program that combines aspects of both management and strategy simulations. You need an Archimedes equipped with a PC Emulator to play it – which rules out the basic 305 machine – and a colour monitor is an advantage too.

The initial setting-up procedures are quite lengthy: First you have to register as a new player, then enter a password to gain proper access to the game and finally choose your own private password.

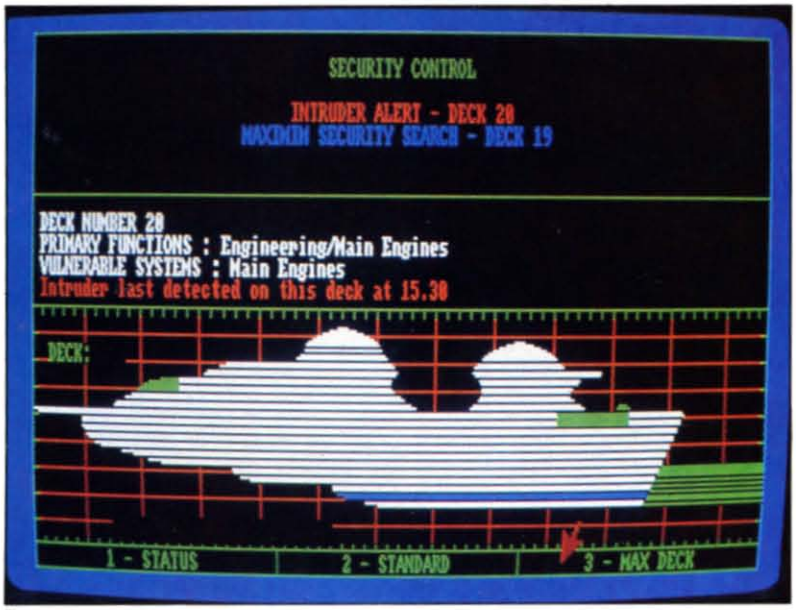
After that the universe is created before your very eyes. One of my reference books tells me that it took seven days. Well Star Fleet 1 took long enough for me to take the car out and fill it with petrol at my local garage and *still* have a minute or two to wait afterwards.

Although subsequent entry into the game is considerably speeded up, you'll need at least an hour of spare time to make it worth starting a playing session.

In the package are a couple of well-produced booklets which are essential reading before beginning to play the game properly. They are a mixture of background and instruction, and an hour spent absorbing the information given is well spent.

Your task is to rid your sector of the galaxy of assorted baddies – the number of enemies and time allowed varies from mission to mission. As your experience and expertise increases, so does your rank and the difficulty of the missions encountered if you are to receive further promotion.

You can seek out and destroy the enemy with torpedoes or disable them with phaser fire then capture and tow them to a star base where you can also replenish your supplies.



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SECURITY CONTROL

INTRUDER ALERT - DECK 20
MAXIMUM SECURITY SEARCH - DECK 19

DECK NUMBER 20
PRIMARY FUNCTIONS : Engineering/Main Engines
VULNERABLE SYSTEMS : Main Engines
Intruder last detected on this deck at 15.30
```

The game in action

My first mission saw me totally disabled and powerless, my second left my ship a raging inferno, I ran out of time on the third but the fourth and fifth I completed. I felt pathetically grateful to be told I was a hero and to be promoted from cadet to Lieutenant JG. That, I think, indicates something of the addictiveness of what at first sight appears a rather unprepossessing game.

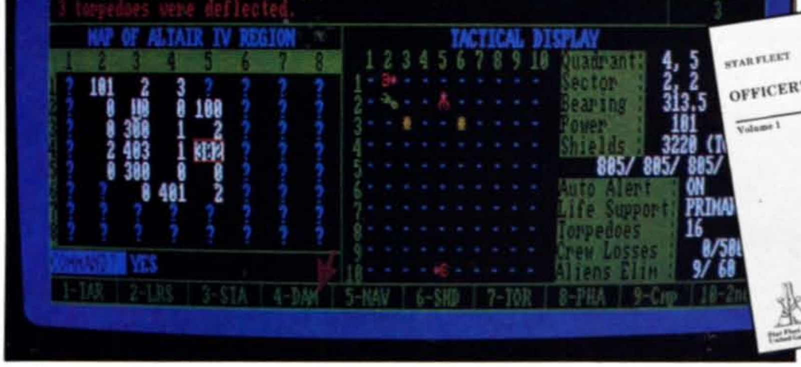
The screen display is fairly simple and such graphics as are present are relatively crude. Star Fleet 1 is no Zarch, yet it has the compelling quality of a first-rate idea well implemented.

The game is well bug-proofed. Irrelevant entries are trapped and excellent use is made of the function keys to provide the many controls of your ship. A mixture of real-time activity and reflective planning are required to master this program – and the activity can get pretty hectic on occasions.

If you like management and strategy simulations this is for you – I'm just off to have another session.

Mad Hatter

Presentation	***9***
Atmosphere	***9***
Graphics	***5***
Addictiveness	***9***
Value for money	***8***
Overall	***8***



```
COND: *RED* ZALDRON PRESENT                          MET: 5.62
475 unit hit on ATLANTIS by KRELLAN in sector 1, 2
176 unit hit on ATLANTIS by KRELLAN in sector 1, 6
220 unit hit on ATLANTIS by KRELLAN in sector 2, 5

ZALDRON DETECTED

TORPEDOES AWAY!
KRELLAN in sector 1, 6 destroyed!
 3 torpedoes were deflected.

MAP OF ALTAIR IV REGION          TACTICAL DISPLAY
 1   2   3   4   5   6   7   8   1 2 3 4 5 6 7 8 9 10  Quadrant:  4, 5
 ?  101  2   3   ?   ?   ?   ?                         Sector   :  2, 2
 ?   0  100  0  100  ?   ?   ?                         Bearing  :  313.5
 ?   0  300  1   2   ?   ?   ?                         Power    :  101
 ?   2  403  1  [illegible]  ?   ?   ?                 Shields  :  3220 (T
 ?   0  300  0   0   ?   ?   ?                            805/ 805/ 805/
 ?   ?   0  401  2   ?   ?   ?                         Auto Alert    : ON
 ?   ?   ?   ?   ?   ?   ?   ?                         Life Support  : PRIMA
 ?   ?   ?   ?   ?   ?   ?   ?                         Torpedoes     : 16
                                                       Crew Losses   :  0/50
 YES                                                   Aliens Elim   :  9/ 60
1-TAR | 2-LRS | 3-STA | 4-DAM | 5-NAV | 6-SHD | 7-TOR | 8-PHA | 9-Cmp | 10-2n
```

Searching a sector

STAR FLEET
OFFICER'S MAN
Volume 1
STAR FLEET
OFFICERS ACADEMY
TRAINING MANUAL
Volume I
STAR FLEET
OFFICER'S MANUAL
SUPPLEMENT
Volume I

Zenon ... nice graphics, shame about the plot

Price: £4.99 (5.25in disc), £6.95 (3.5in disc), £4.95 (tape)
Supplier: Impact Software, Neepsend House, 1 Percy Street, Sheffield S3 8AU.
Tel: (0742) 769950

DURING the next few months Impact Software is planning to release a number of top quality games at budget prices. Hot on the heels of the excellent Clogger comes Zenon – a one or two player arcade style action game with 250 levels.

The packaging sleeve reveals that the game has no real plot. All you are told is that you have to penetrate all 250 levels of the game – a feat that would require an extraordinary amount of stamina and concentration. Little wonder the manufacturers have claimed that it has yet to be achieved.

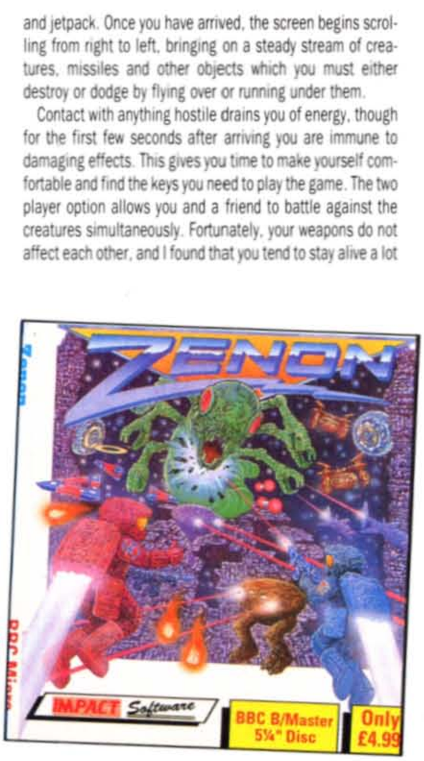
Having begun to play, another reason why I would not succeed in penetrating to the heart of Zenon soon became apparent. The sad fact is that the game is repetitive and boring. It failed to hold my attention for very long and I soon began to lose interest in running, or flying along, zapping the steady stream of creatures barring my path to the next level.

This is a shame because the amount of time that must have been spent in designing the sprites for the many different aliens, androids, fireballs and missiles that are encountered has been wasted. I'll probably never get to see half of them.

I also began to get the feeling that I'd played something very similar before. I couldn't remember what it was at first, but looking through my collection I dug out Rampage, which seems to have more than a passing similarity – and is a much more interesting implementation.

The mechanics are reasonably simple: You are beamed down to the surface of the planet Zenon with a Repeat laser and jetpack. Once you have arrived, the screen begins scrolling from right to left, bringing on a steady stream of creatures, missiles and other objects which you must either destroy or dodge by flying over or running under them.

Contact with anything hostile drains you of energy, though for the first few seconds after arriving you are immune to damaging effects. This gives you time to make yourself comfortable and find the keys you need to play the game. The two player option allows you and a friend to battle against the creatures simultaneously. Fortunately, your weapons do not affect each other, and I found that you tend to stay alive a lot longer with a friend to back you up. Once your energy is depleted you lose a life, and losing four means the end of the game. Occasionally you encounter a weapon cannister which, when touched, exchanges your current device for one contained in it. This can sometimes increase your potential for wreaking damage – but it can also work the other way.



It is possible to restore lost energy by either avoiding taking damage, thus allowing your spacesuit to recharge slowly, or by collecting the energy cells which occasionally pass by. To complete a level you must negotiate a distance equivalent to about 10 screen widths and this allows you to progress on to the next – which is slightly more difficult and contains new creatures to zap.

Zenon has all the sounds you would normally associate with this type of game, but if you like a bit of peace and quiet you can turn them off. The same applies to the music, which, you can have running continuously as you play.

I don't rank this as one of the best games I've played, but then at about half the normal price of many others, I didn't expect it to be. However, if Impact can produce more games at the same price, with the same excellent quality graphics with more to them than just zapping aliens it might be on to a nice little earner.

And we impoverished gamers might be on to a good source of entertainment which doesn't leave us with a big hole in our pockets.

Desmond

Sound	7
Graphics	8
Playability	5
Value For Money	8
Overall	7

Commando ... the heat of battle

Price: £2.99
Supplier: Encore, Eastern Avenue, Lichfield WS13 6RX.
Tel: 0543 414885

COMMANDO is the officially licensed home micro version of the arcade-machine game of the same name. For the information of anyone who has not ventured into an amusement arcade in the last few years, or who missed the game on its initial release for the BBC Micro, Commando is another of the one man against the odds combat games that have become so popular in recent years.

You are cast in the role of Super Joe, the commando of the title. Armed only with a submachine gun and half a dozen grenades, you must penetrate the enemy defences and destroy the fortress. Easy to describe, much less easy to accomplish.

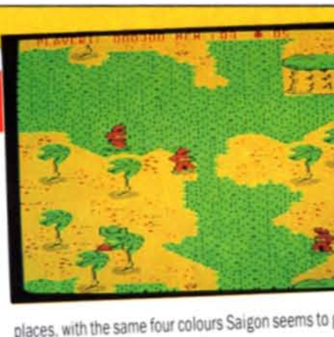
Like Tynesoft's Saigon, which I reviewed in the July 1988 issue of *The Micro User*, Commando features a number of different scenes. Once you have fought your way from the bottom of one screen to the top, it scrolls down to reveal a new set of hazards.

Every new screen brings a fresh horde of enemy soldiers streaming from all directions – to fall beneath your machine gun and your grenades come in handy when their numbers become too great. But remember that they are equipped with similar weapons. One stray bullet or grenade can prove fatal, so keep a sharp eye about you.

Fans of Superior's Play It Again Sam series will know that Commando also features on the Sam 3 compilation. However there is one difference between the two versions: When playing the game it is often difficult to determine from the screen display when you have been killed. Superior has added a blinding white flash to herald your call-up to the ranks of the ex-commandos. However, this is an exact re-release of the original version – indeterminate demise and all.

I have never been particularly impressed by the BBC Micro version of Commando. Its main drawback is that it comes off very badly from the dilemma that faces every programmer – weighing up the pros and cons of each screen mode and the conflicting features of screen resolution, size and available colours.

Commando runs in four colour Mode 5 and I found that many graphic features tended to merge into one another. Although I get the impression that battlefields are pretty drab places, with the same four colours Saigon seems to generate an impression of far greater vibrancy.



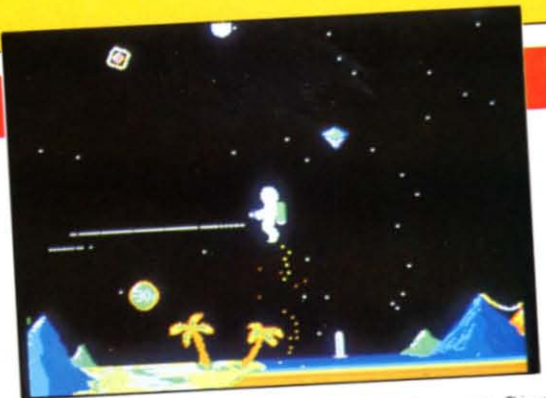
Whether you go for Play It Again Sam 3 or this stand-alone Commando depends very much on how many of the other games featured on Sam 3 you already own. But either way Commando gives you the chance to play the all-conquering superhero. If you're a fan of shoot anything that moves games you could do worse than this one.

Hac-Man

Sound	5
Graphics	6
Playability	6
Value for money	6
Overall	6

SOFTWARE SCENE

Jet Fighter ... yawn from the grave



Price: £14.95
Supplier: Minerva Software, 69 Sidwell Street, Exeter EX4 6PH
Tel: 0392 437756

I WAS really looking forward to a flight simulator on the Archimedes, so I eagerly grabbed Jet Fighter and booted it up without looking at the sleeve – only to suffer a terrible disappointment. It isn't a flight simulator, it's just Jet Pac.

Why can't we have something original on the Archimedes? All we've got are continual re-hashes of old 8 bit games plus a couple of vertical scrollers. What's going on?

Moan finished... on to the game. The scenario is that you, space-suited humanoid that you are, are stuck on a strange planet. Pieces of your spaceship are scattered about on various platforms that hang mysteriously in air – in exactly the way that bricks don't.

Your first task is to assemble the ship, and this is not too difficult in itself. Unfortunately the denizens of this particular planet belong to the one-touch-death variety and they float around in various patterns. So from the planet's surface you jet off and fly around avoiding trouble and generally having a good time.

Having re-assembled the ship you need to refuel it. Well, someone up there must like you because he – whoever he is – keeps dropping little cannisters marked Fuel down from the sky. However, you have to keep moving around looking as sometimes they come to rest on the previously mentioned platforms.

Meanwhile you occasionally find other odd items dropping down – Eccles cakes, a letter from him upstairs and numerous other things. Collecting them adds to your score but doesn't help you get off the planet.

Once you've collected enough fuel you can walk behind the rocket and up you go – only to land again for the second level. This time you only need to refuel, but the game continues in a similar vein with more baddies appearing – like the homing owl head and the small but deadly unmoving invincible blob.

All the sprites are well animated and quite detailed but the colour choice is rather garish. The overall playing area is several times larger than the screen and the scrolling is very smooth.

Control is via the mouse and very easy, but the screen background is a set of stars which never move. This means that unless there happens to be something else on the screen you can't tell how fast you're moving, and as such it's very easy to bump into the baddies.

Perhaps I'm too old for this game and youngsters – say 5 to 10 – might find it fun. Although well implemented it lacks any staying power and it certainly didn't have me running back for more. Considering the high quality of Orion, also by Minerva, I'm surprised this made it to the shelves at the same price.

Lazarus

Sound	6
Graphics	7
Playability	8
Value for money	9
Overall	7

Joe Blade II ... tricky beat-'em-up

Price: £1.99
Supplier: Players, Mercury House, Calleva Park, Aldermaston, Berkshire RG7 4QW.
Tel: 07356 77421

JOE Blade II is, unsurprisingly, the sequel to Joe Blade, a game which I thoroughly enjoyed when it was released a short while back. This new version is very similar to the original and features that teenage pin up and pop idol, media celebrity, hero of the people, defender of the flag and helper of those less fortunate than himself – or so the cassette inlay claims – Joe Blade.

In this latest romp you are again in control of the do-gooder and your task is to clean up the streets of London circa 1995. No, you're not a garbage collector – though you'll find several dustbins which can be collected on your travels – you are a one man police force out to reduce the rapidly increasing crime rate.

The city has gone to the dogs since 1989 and the place is crawling with muggers, skinheads, punks and the like. Anyone who ventures out into the backstreets and alleyways is likely to be pounced on and given a severe beating, not to meantion being robbed to boot.

Your task is to patrol the city keeping a sharp lookout for shady characters and signs of trouble. Any punks you come across on your beat must be disposed of by leaping up Kung-Fu style and booting them in the head. They then disappear in a cloud of dust, but there always seem to be more just around the corner.

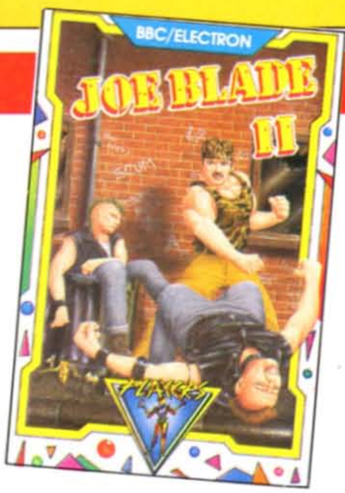
The aim is to do away with 60 or so punks and rescue 16 citizens. You'll come across the latter every now and then as you walk around.

Like the original game, the graphics are superbly detailed and the playing window – which occupies the major part of the screen – shows a 3D side-on view. You can walk left and right and through alleyways into and out of the screen. As you move on to the next screen it rapidly flicks up – there's no scrolling here.

Apart from punks, you'll come across clocks which give you extra time to clean up the city – you've got just 10 minutes – and dustbins, for which I've yet to find a use.

On encountering a citizen the screen clears and up pops one of four types of puzzle. All involve re-ordering a mixed up list of the numbers one to four. Sounds easy, but you can only swap certain pairs of numbers, and this pair is rapidly changing. To make things even harder the numbers are displayed as strange hieroglyphics and there's a time limit too.

If you don't succeed you are dead meat and have to start all over again. I found this part extremely difficult and it spoilt the game slightly.



Joe Blade II is a bit too like the original game in many respects and if you have that I would suggest you try this version before buying it. If however, you haven't seen Joe Blade in action it's an entertaining – if at times frustrating – game that will keep you amused for many an hour. Well worth a look.

Roland Waddilove

Sound	7
Graphics	10
Playability	8
Value for money	9
Overall	8

Play it Again Sam 5 ... destined for the charts

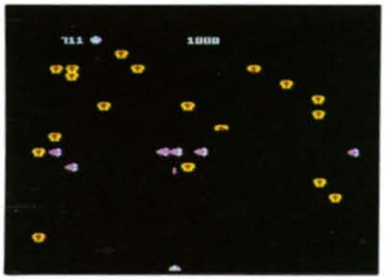
Price: £9.95 (tape) £11.95 (disc)
Supplier: Superior Software, Regent House, Skinner Lane, Leeds LS7 1AX.
Tel: 0532 459453

SUPERIOR Software's policy of buying up other companies or their software is having a noticeable effect upon the quality of its Play it Again... compilations. Its already impressive games portfolio has been swollen with top titles from Alligata and Micro Power – some of which are found in this volume.

I was delighted to see that Micro Power's **Imogen** had been included – it has been a favourite of mine ever since I reviewed it many years ago. Imogen is a wizard who lost a few of his marbles as a result of a disagreement with a dragon.

For his own safety, and that of the local community, he was incarcerated in a dungeon by the great wizard. He must earn his freedom by solving the dungeon's many puzzles and collecting the 16 pieces of the Spell of Release.

One of Imogen's party pieces is transformation – he can change from wizard to monkey to cat at will. Each form has a different ability: The wizard can use objects, the monkey is an expert climber and the cat can leap great distances. Your desired form is selected using a series of icons at the top of the screen.


Exterminating insects in Bug Blaster

There is no time limit, the only stipulation being that the 16 sections must be completed using no more than 150 transformations. If this seems generous let me assure you that it isn't. A few wasted changes as a result of badly timed leaps can easily mean the difference between success and failure.

Puzzles range from traditional adventure game brain strainers to obvious, but difficult to execute, tests of manual dexterity. I would also add that a warped sense of humour is a distinct advantage when playing Imogen.

Having got themselves the basis of a superb game, Micro Power blended these puzzles with graphics of a quality that had never before been seen on the BBC Micro. High resolution monochrome characters were animated with a degree of grace and realism that brought them to life. Imogen was, and still is, in a class of its own in the arcade/adventure field.

Elixir is an arcade/adventure game from the opposite end of the quality spectrum – a most surprising fact as it is the only one of the four programs to come from the Superior stable. This tedious adventure revolves around the exploits of Cyril, the shrunken chemist, as he strives to locate the elixir that will restore him to his former stature.

Cyril clambers about shelves on which stand bottles and jars of pills and potions, the colour of a pill indicating the effect it will have upon Cyril. His snail's pace meanderings are interspersed with fatal falls, killer flash bulbs, acid drips and a runaway circular saw.

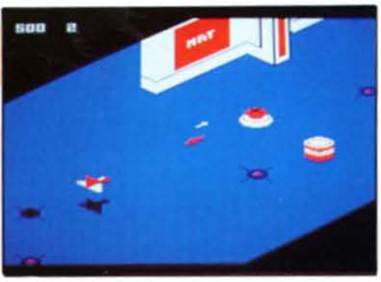
Considering the quality of the other programs in the package I would be very surprised if this one is played at all.

Leaving the arcade/adventure field we take a stroll down memory lane to an arcade game of yesteryear. **Bug Blaster** from Alligata was, and still is, a first rate version of that insect extermination game – Centipede.

Winding its way through a field of mushrooms is a giant centipede – and your task is to blast this Mega-myriapod before it gets you.

The rate of the beast's descent is determined by how many mushrooms it collides with. Each collision is followed by a change in horizontal direction and one step down the screen and the mushroom population increases with each new screen.

Other hazards come in the shape of falling fleas, bouncing spiders and an assortment of other members of the insect family which traverses the screen at regular intervals. Bug Blaster is a rave from the grave that is still capable of setting the pulse racing as you fight for survival against mother nature's rejects.


Attacking the fortress

The final game of the compilation is one which left me open-mouthed when I first saw it. **Fortress** is the only version of Zaxxon that was ever written for the BBC Micro.

For those of you who are too young to remember it, Zaxxon was a diagonally scrolling zap and blast game that had the same effect in the arcades as After-Burner has today. It was a game that you queued up to play.

Flying the latest X3 Starfighter, you must penetrate the enemy's high security defence system. To do this you have to fly at ground level, skimming over walls and squeezing through gaps in electric fences.

Opposition is provided by missile silos, ground-based blasters – and – most difficult of all – enemy fighters. These fast-moving craft respond instantly to your every movement, resulting in many, many, head-on collisions before you learn how to avoid them.

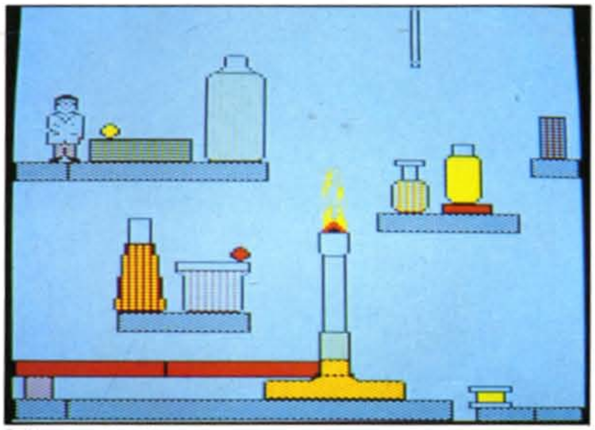
Not being the most economical of aircraft, the X3 has to be refuelled at regular intervals and this is achieved, quite illogically, by blasting the enemy fuel dumps as you advance through the base.

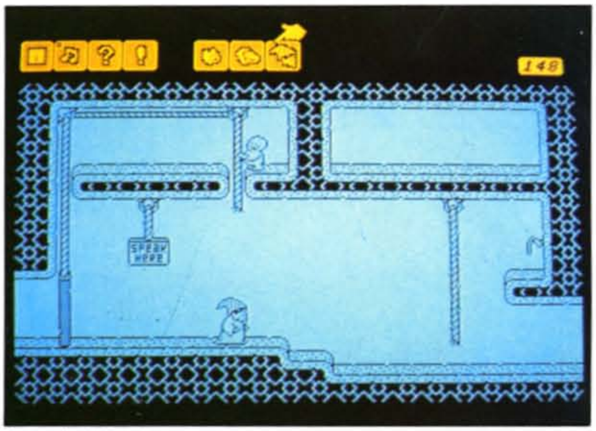
I am sure that no other software company bothered to compete with Amcom's Fortress because it was simply *the* best arcade game at that time.

With the exception of Elixir, Play it again Sam 5 is yet another top quality Superior Software release that is destined for the charts.

Carol Barrow

Sound	8
Graphics	9
Playability	9
Value for money	9
Overall	9


Cyril in a scene from Elixir


Imogen: An old favourite

Taking up the options

Ken Down makes a selection from his new menus

WE looked last month at how to get our menu on to the screen. Now it's time we worked out a method of decoding it – a way of telling which option was selected and from which menu or sub-menu. In Basic II it's possible to set the 6502 processor's registers by using the resident integers *A%*, *X%*, *Y%* and *C%*. The values in these variables are transferred to the *A*, *X* and *Y* registers and the Carry flag.

It's possible to do much the same sort of thing in Basic V but in a more convenient way using the SYS command. Any variables that follow the call number, or name, are assigned to the Risc chip's registers with the first going to *r0*, the second to *r1* and so on. Not only that, but the full 32 bit number is transferred, in contrast to the 8 bit 6502 registers.

As well as returning a value to the variable *result%* the Wimp Manager routine, *Wimp–Poll*, also stores information in the area of memory the address of which is in *r1 – poll%*.

When you click the select button over a menu option the Wimp returns a result of nine. It also sets up the parameter block *poll%* so that the first four bytes contain the number of the option in the first menu. The second four bytes contain the number of the selected option in the second menu, and so on. When no further sub-menus were activated, the final four bytes contain the value −1.

In the sample program published last month option four from the main menu had no sub-menus attached. If you click on this option *poll%* will be set up as follows:

Address	Value
poll%!0	3
poll%!4	−1

You will notice that the option numbers returned in *poll%* start at zero, so what we have called option one is called zero by the Wimp.

Option three on the other hand has one sub-menu. Select this and *poll%* is returned with offset values as shown in the following table:

Address	Value
poll%!0	2
poll%!4	0
poll%!8	−1

By checking the contents of *poll%* we can work out which option from which menu has been chosen. We can also deal with the situation where there are sub-menus but the user has accidentally – perhaps – clicked the main menu. So let's put in a line to direct the program to the menu decoding procedures:

```
310 WHEN9:PROCmenuselect
```

The *menuselect* procedure also uses the CASE statement:

```
1600 DEFPROCmenuselect
1610 CASE!poll%OF
1620 WHEN0:PROCzero
1630 WHEN1:PROCone
1640 WHEN2:PROCtwo
1650 WHEN3:PROCthree
1700 ENDCASE
1710 ENDPROC
```

Each option in the menu results in a call to a different procedure and it's the task of the individual routine to look after the sub-menus and make sure they have been properly used. As these procedures are not specific to the Wimp they will be given line numbers above 10000. They don't do anything very significant, merely confirm that the proper choices have been made and illustrate what we will be doing later in this series.

In view of the fact that option one from the main menu is disabled you may be wondering why there is a PROCzero. The reason is that, if you choose *Subsub3*, PROCtwo replaces the *@* in the main menu string with a full stop and re-creates the menu block with a call to FNcreatemenu. Next time you click the menu button and call up the menu you will find that option one is enabled.

Using the same method we could disable some options that were enabled or transfer the tick from one option to another.

So here are the procedures called by the menu – they aren't terribly exciting:

```
10000 DEFPROCzero:VDU4:PRINTTAB(10,16)"At las
t!":VDU5:ENDPROC
```

There is really nothing to say about this except to comment that all screen operations are usually carried out at the graphics cursor so you wouldn't normally use VDU4 in the middle of a Wimp program – these routines are just for demonstration purposes. Here's the next one:

```
10100DEFPROCone:VDU4:IFpoll%!4=-1OR(poll%!4=1
ANDpoll%!8=-1)THEN
10110VDU7:PRINTTAB(10,16)"Invalid selection"
10120ELSE
10130IFpoll%!4THEN
10140PRINTTAB(10,16)"Sub1"
10150ELSE
10160IFpoll%!8=0PRINTTAB(10,16)"Subsub1"
10170IFpoll%!8=1PRINTTAB(10,16)"Subsub2"
10180IFpoll%!8=2PRINTTAB(10,16)"Subsub3":i%=I
NSTR(menu$,"@Option 1"):MID$(menu$,i%,1)=".":
j%=FNcreatemenu(menublock%,menu$)
10190ENDIF
10200ENDIF
10210VDU5
10220ENDPROC
```

Notice how line 10100 checks to make sure that the correct sub-menu has been clicked on and the use of the multi-line IF statements in this procedure. They certainly make life easier.

Line 10180 makes option one available by using the MID$ statement as an assignment to alter the contents of *menu$*. After making this alteration it is necessary to re-create the menu information block, so the program calls FNcreatemenu again. Next type:

```
10300DEFPROCtwo:VDU4:IFpoll%!4=-1THEN
10310VDU7:PRINTTAB(10,16)"Invalid filename"
10320ELSE
10330IF$mtext%=""PRINTTAB(10,16)"No name"ELSE
PRINTTAB(10,16)$mtext%
10340ENDIF
10350VDU5
10360ENDPROC
```

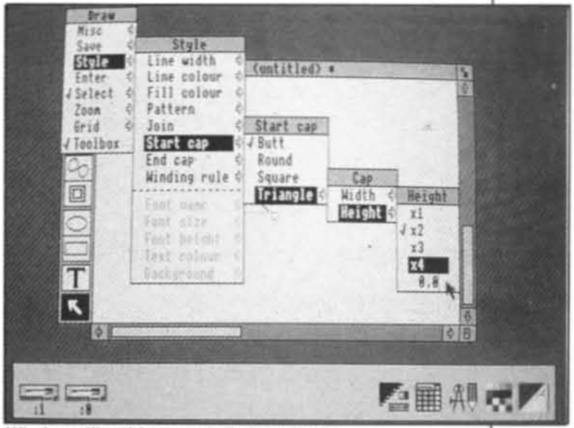
This procedure not only checks that you have clicked on the proper input box but also ensures you haven't deleted the default filename. By now you have probably discovered that when you move the mouse pointer over the input box a strange, vertical cursor called a caret appears. It can be moved left and right with the cursor keys and the delete key will kill text to the left and Copy deletes to the right. From here we move to:

```
10400DEFPROCthree:VDU4:PRINTTAB(10,16)"A good
 choice":VDU5:ENDPROC
```

When this is typed in, try it and see what happens when you click the various menu options using the left hand – Select – button.

As I promised last month, here's a simple routine to calculate the value for the icon flag

Turn to Page 38 ▶



Windows like this can easily be created using the techniques in this series

SPRITE ACTION

Prepare two sprites using the sprite editor from the utilities folder on the Welcome disc – you can find this either by using the DeskTop or by entering:

```
CHAIN"$.Utilities.SEdit"
```

The program operates on sprites in the system sprite area, so if it is run from the DeskTop it will load up those. You can either remove them one by one using the Delete option or press Reset then type:

```
*SNEW
OLD
RUN
```

Redefine the first eight colours to black, red, green, yellow, blue, purple, cyan, white. Then create two sprites called stop and warn in Mode 12 with the following sizes:

Sprite name	Width	Height
stop	45	23
warn	46	23

You can design them however you want or use the DeskTop originals modified to the right size. Make the sprites' surroundings transparent, otherwise they will blank out the background colour on which they appear. Details of how to do this are found on page 169 of the User Guide where it talks about defining a sprite mask.

When you've finished, make sure your work disc is in the drive and save the sprites under the name MoneyIcons, which is the file the program looks for in line 40.

◀ From Page 37

MASKING THE WIMP_ POLL ROUTINE

Various bits of the 32 bit mask prevent a particular poll option being returned. To calculate the correct overall mask value choose the items you don't want signalled and add up the individual values.

Bit number	Value	Masks out
1	2	Re-draw window request
4	16	Pointer is leaving a window
5	32	Pointer is entering a window
6	64	Mouse button has been pressed
8	256	Key has been pressed

The other bits should theoretically mask other operations but don't.

word. It makes extensive use of <<, making it easy for you to follow what's going on. Where appropriate simply press *Y* or *N*. In other places, such as line 5420, you are prompted to INPUT a number, which means you should type the number and then press Return. The final flag result is printed in both decimal and hex. You can include the routine into your programs for easy reference:

```
5400DEFPROCiconflags:q%=0:t%=FALSE:h%=FALSE:f
ont%=TRUE
5410PRINT"Does the icon contain text? Y/N";:g
%=GET:IFg%=89q%+=1:t%=TRUE
5420PRINT"Is the icon a sprite? Y/N";:g%=GET
:IFg%=89q%+=1<<1
5430PRINT"Does the icon have a border? Y/N";
:g%=GET:IFg%=89q%+=1<<2
5440IFt%PRINT"Is text centred horizontally?
Y/N";:g%=GET:IFg%=89q%+=1<<3:h%=TRUE
5450IFt%PRINT"Is text centred vertically? Y/
N";:g%=GET:IFg%=89q%+=1<<45460PRINT"Is the b
ackground filled? Y/N";:g%=GET:IFg%=89q%+=1<<
5
5470IFt%PRINT"Is the text font anti-aliased?
 Y/N";:g%=GET:IFg%=89q%+=1<<6:font%=FALSE
5480PRINT"Will the icon need your help for r
edrawing? Y/N";:g%=GET:IFg%=89q%+=1<<7
5490PRINT"Is icon text indirected? Y/N";:g%=
GET:IFg%=89q%+=1<<8
5500IFt%IFNOTh%PRINT"Is text right justified
? Y/N";:g%=GET:IFg%=89q%+=1<<9
5510PRINT"Enable multi-selection with ADJUST
 button? Y/N";:g%=GET:IFg%=89q%+=1<<10
5520INPUT"INPUT Button type (5 if not known)
";b%:q%+=(b%<<12)
5530INPUT"Exclusive Selection Group (0 if not
-15 max)";b%:q%+=(b%<<16)
5540PRINT"Invert icon when selected? Y/N";:g
%=GET:IFg%=89q%+=(1<<21)
5550PRINT"Icon shaded and disabled? Y/N";:g%
=GET:IFg%=89q%+=(1<<22)
5560IFfont%INPUT"Foreground colour? 0-15"b%:
q%+=(b%<<24)
5570IFfont%INPUT"Background colour? 0-15"b%:q
%+=(b%<<28)
5580IFNOTfont%INPUT"Font number";b%:q%+=(b%<<
24)
5590PRINTq%,~q%:ENDPROC
```

Notice that line 5490 asks you if the icon text is indirected. Using the method I showed you last month the longest menu option possible is 11 characters. However it is possible to store its text elsewhere and change the information chunk to contain the address of the text. PROCinit already has a block of memory set aside to hold the text – *textblock%*.

In order to keep track we need to pass another variable to FNcreatemenu. This means that the definition of FNcreatemenu has to change and also all calls to it:

```
 1200DEFFNcreatemenu(mb%,t$,tb%)
 1360t$=MID$(t$,INSTR(t$, ] )+1):submenu%=FNc
reatemenu(nextmenu%,new$,nexttext%)
 5240j%=FNcreatemenu(menublock%,menu$,textblo
ck%):ENDPROC
10180IFpoll%!8=2PRINTTAB(10,16) Subsub3 :i%=I
NSTR(menu$,*Option 1 ):MID$(menu$,i%,1)= . :
j%=FNcreatemenu(menublock%,menu$,textblock%)
```

In the same way as we calculated the address of *nextmenu%* we need to work out the address of *nexttext%* based on the number of items in each menu:

```
1230nextmenu%=mb%+28+24*numofitems%:nexttext%
=tb%+24*numofitems%
```

Instead of storing the menu option string at *ptr% + 12* with:

```
$(ptr%+12)=t$
```

we need to store the text at *tb%* and put its address in *ptr%!12*. Notice that *tb%* is then increased by 24, thus allowing you a maximum of 23 characters per menu option. If you wish to alter this, either to allow longer or shorter strings, you should change the number 24 in both 1230 and 1500:

```
1500$tb%=LEFT$(t$,g%-1):ptr%!12=tb%:tb%+=24
```

The final step is to inform the Wimp that the menu text is indirected. We change the flag byte from &10021 to &10121 in line 1550:

```
 1550ptr%!8=&10121ORshade%ORwriteable%<<6OR0<
<24OR7<<28:REM last two are foreground and ba
ckground colours
```

When you run the program now everything should work exactly as before. The difference will come if you change one of the menu options to something like Balance Sheet for May. At first only 11 or 12 characters will appear because the menu width set in line 1290 is too narrow. A good rule of thumb is to set the width to (length of longest string)*16+24. In our example this would mean a width of 360.

● *Next month we'll start to look at handling icons.*

CEEFAX Guide

B B+ M

Software is currently transmitted for a period of one week. Files are available from Friday afternoons to the following Thursday evening, with the exception of the Issues teachers' notes which, due to their topical nature, are available from the Wednesday morning to the following Tuesday evening during the week of transmission. The details are provisional only.

Jan 6 to 12

T/Mou06 SWMouse SWRMice SWTest
The Opcodes series – designed to help you get more from your micro – concludes its study of rodents with an explanation of how to save memory by monitoring the movements of a mouse from sideways ram.

Prog1 to Prog8
Lost at sea? Find out all about navigation lights and buoys, as seen from the bridge of a sailing boat. If you enjoy sailing, this important program could save your life.

Cur/M Cur/T Cur/B
Many people find the unalterable flash rate of the cursor can cause problems like headaches while they're using word processors. This utility slows the flash rate down and reduces the risk of these problems, making the software more manageable.

Giant
An experiment in broadcasting software for the Hybrid Music 500 synthesiser. This program is not compatible with the 5000 system, but if enough people are interested further music files may follow.

AuNotes
A program to allow shools to receive teachers' notes with the minimum of fuss and effort.

Teacher's notes
Notes to accompany the schools programme *Scene*.

Chess1 Chess2
Enjoy a quiet but fascinating game of Chinese Chess against the micro or a human opponent. From the May 1988 issue of *The Micro user*.

Jan13 to Jan 19

T/Pen00 PenTest RHBoot
The informative Opcodes series turns its attention to the use and control of a light pen from within your own software. This – the first in the series – introduces the basic principles of pen design.

Master Emulator
A major package, in rom image format, to make your standard BBC B emulate a Master. This superb utility gives many of the features not normally found on the original machine.

Facilities include additional commands such as *CONFIGURE, *ROMS, *UNPLUG and over 20 further utilities. Many commands not found on the Master are also included, for example *PRINTBUFFER which sets up a printer buffer in memory, so Master owners will also find the routine invaluable.

A full User Guide is included with the broadcast, giving all the information necessary to get the most from your micro.

Switch Switch2
Exercise your mind with this intiguing puzzle. Although the principle of Switch is simple enough, it takes ingenuity, patience and very careful thought to solve.

TextRd
A utility to help you read any text file – including those broadcast on Telesoftware. Teacher's notes and other text files can be read on screen or output to your printer as required.

Notes for schools
Notes for the current schools programme *Scene*.

Dirk
Improve your ADFS disc handling with this fully recursive directory kill utility from the May 1988 issue of *The Micro User*.

Jan 20 to Jan 26

T/Pen01 Offset
Module one of the Opcodes light pen course introduces the software techniques needed to find the co-ordinates of the light pen's position on the screen. However, nothing is ever simple. Some of the problems of using one with the BBC Micro are also discussed.

Colour1 Colour2
Use your Epson FX black and white printer to give you a full colour dump of any screen image. Impossible? Armed with a few different coloured ribbons – readily available – Colour1 will produce superb and stunning full-colour images of your screen displays. Why spend a fortune on colour printers when these programs will produce the same result?

Break T/Break
Have you ever accidentally pressed Break and lost all your hard programming work? Well, here's the solution. This routine will protect your software from corruption and restore the program and variable values if Break is accidentally pressed.

TTXPrnt
Another chance to receive the Ceefax page printout utility for the ATS rom. This routine will work with almost any printer, producing the text of the currently displayed page. A version specifically for use with the Integrex Colourjet printer producing full colour will be available from Telesoftware in the near future.

Teachers' notes
Notes to support the BBC Educational programme *Scene*.

Beasty
Play Beastiroids – an intriguing version of the classic arcade game – from the June 1988 issue of *The Micro User*.

Jan 27 to Feb 2

T/Pen02 IOINTER
More from the Opcodes series explaining the use and control of a light pen. Each time the electron beam of the screen passes the end of the pen an interrupt is generated within the micro. T/Pen02 shows how to use this interrupt to find out which part of the screen the pen is pointing at.

Timer Tmr/Inf
A routine to keep track of your recordings – on video, cassette or reel-to-reel. Timer calculates the duration of recordings from the tape counter and vice-versa.

TVAlign TVInfo
Test your monitor or TV with TVAlign which produces a series of screen displays to test the characteristics of your VDU. An experienced TV engineer will be able to use these tests to adjust your set to optimum performance.

Econet Teletext File Server
Another chance to receive the Teletext file server for Econet systems. This allows any station on an Econet network to receive teletext pages with just a single teletext adapter on the system. Teletext can even be accessed across an Econet bridge.

Teachers' notes
Notes to accompany the schools broadcasts *Scene*, *Introducing Science Extra: Computers* and *Secondary Science*.

Patrol Moon2
Can you collect enough power crystals to escape from this hostile planet? Try your hand at arcade action from the October 1988 issue of *The Micro User*.

The very last Word?

Ian Whitmore investigates Acorn's successor to View

Product: 1st Word Plus
Price: £91.94
Supplier: Acornsoft, Acorn Computers Ltd, Fulbourn Road, Cherry Hinton, Cambridge CB1 4JN
Tel: 0223 214411

BEFORE the launch of the Archimedes, Acorn considered View to be the definitive BBC Micro word processor. But moving from the 8 bit into the big league has meant a big jump in concepts – and 1st Word Plus is *the* system for the Archimedes.

The word processor itself has been around for quite a while on 16 bit micros using the Gem Wimp environment. Acornsoft arranged with GST – who wrote the original – to port it over to the 32 bit Archimedes. It is supplied on two unprotected discs. The first contains the word processor and mail merge and the other provides utilities such as printer driver, hard disc installation program and dictionary facilities.

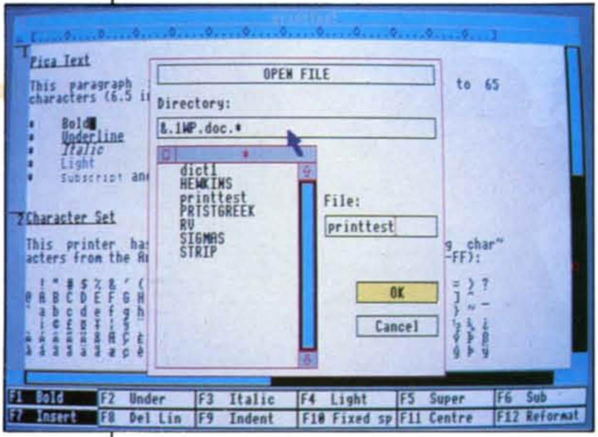
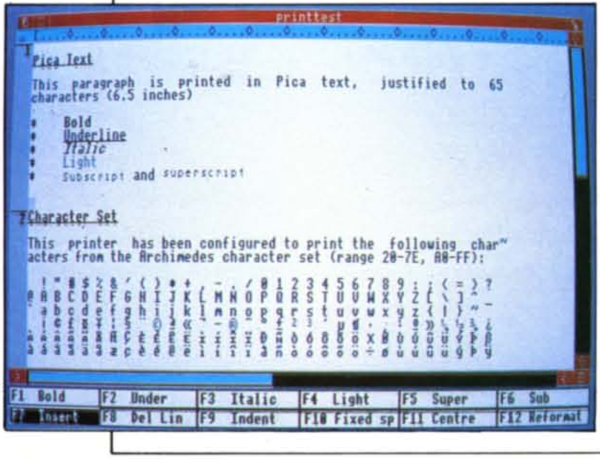


Figure I: The file sub-menu



Pica Text

This paragraph is printed in Pica text, justified to 65 characters (6.5 inches)

- Bold
- Underline
- Italic
- Light
- Subscript and superscript

Character Set

This printer has been configured to print the following characters from the Archimedes character set (range 20-7E, A0-FF):

Figure II: The display is almost wysiwyg

The manual is 245 pages long in the same style as the one supplied with the Archimedes – with large unwieldy pages which are often virtually empty. However the information is clear and gives a good tutorial-based introduction to word processing in general, as well as detailed guidance on 1st Word Plus and 1st Mail.

Loading is simple – just click the icon from the DeskTop, boot the disc or type **1stword+* at the Arthur prompt. When loaded you get about 400k of text space on a 310 and 3Mb on a 440 – that's 900 pages of A4. The package is Wimp based and works in Mode 12 – or Mode 20 if you have a multi-sync monitor. On start-up you are presented with the file submenu – Figure I – inviting you to load a document from the 1wp.doc directory.

You can select the file you want either by double-clicking Select on the name in the list or by typing it in and pressing Return. Moving through the directory structure is just a case of picking them from the file window or leaving the current one by clicking the close icon.

Although you can use any directory structure you wish, 1st Word Plus makes very good use of it by default: Under 1wp there are seven sub-directories:

Directions	Contents
doc	Current documents
bak	Document backups
pic	Picture files
hex,cfg	Printer driver source and object files
dat,mrg	Mail merge files

Once selected, a file is loaded and a window opened for it.

The Wimp operates in the standard way and you get 74 characters across and 28 lines down in a fully opened window. 1st Word Plus is almost wysiwyg – what you see is what you get – as the program displays all the supported printer facilities on screen if it can – see Figure II. It does not show different type sizes such as pica, elite, condensed and expanded, although it alters the line length intelligently to give the same physical margin when printed.

Always accessible but hidden by the text window is a display occupying the lower half of the screen containing all the available characters, a number of editing facilities like Delete and cursor movement and the printer driver and port being used. This means that you can edit a document using just the mouse without touching the keyboard, although it's a bit tedious. The real bonus is that the Ascii characters above 128 can be selected and used within the text – only those supported by the printer driver are displayed.

A strip is provided giving the various operations from the function keys alone and Control+function key. Shifted function keys do nothing – a hold over from some other micros where f2 is Shift+f1 – and you can't use them as standard BBC Micro soft keys.

The many facilities are all accessible via the mouse and pressing the Menu button brings up the main menu from which you can open various submenus containing the vast array of functions.

The file menu – Figure III – allows you to open up to four documents simultaneously. Printing is from the disc copy of a file and other options are save, read/write insertions, delete files and exit the program.

Search and replace options are on the edit menu – Figure IV – with four powerful features that select word processor, hyphenation, insert and word-wrap modes. With word processor mode active all loads and saves are done in 1st Word Plus file format and all the usual options are available. But with this off you are in text edit mode and file operations are performed as Ascii only. One drawback of the system is that 1st Word Plus recognises line feeds at the end of every line, so almost all imported files have to be doctored before use.

Hyphenation allows long words at the ends of lines to be hyphenated when the text is reformatted, and it worked very well. One particularly useful feature on the edit menu is goto, which lets you move to one of four invisible markers which you can place within the text – or just go to any specific line.

Block operations are well supported, even allowing you to move text between different documents or save to disc. When a block has been marked you can modify it with the style menu which sets typefaces, justification and so forth. As 1st Word Plus does not reformat automatically when you insert text, a reformat option lets you re-do the paragraph, whole document or between rulers.

If you are about to perform a function that 1st Word Plus considers dangerous a window opens up asking for confirmation.

The text is controlled by rulers, the current one being displayed at the top of the text. The layout menu supports loading, addition and deletion of rulers, plus a powerful footnote option. Clicking the character shown to the left of the ruler gives you the ruler menu which controls such things as character pitch, ruler length, tab stops, justification and tab stops.

From the layout menu you can get to the page layout submenu – Figure V. Here you can insert header and footer text, select page length and top and bottom margins. Unfortunately you can only have one set of headers and footers per document.

The final three menus are spelling, graphics and help. Spell checking from the 40,000 word memory dictionary is fast and intelligent while the Help option gives on-screen explanations of many of the 1st Word Plus features, including those not in the manual – Word and rest-of-line delete.

The graphics option allows pictures to be incorporated, but not manipulated, into your text and output if you're using a dot matrix printer. Colour printing is also supported, but one oddity is that the colours displayed – see Figure VI – are not those that will be printed, nor do they match the original picture. However the printouts match the original.

1st Word Plus is supplied with a number of printer drivers and an appendix in the manual gives clear instructions to help you modify one of those supplied to suit your own purposes. I was able in an hour to create drivers to support all the Ascii characters higher than 128 on my Epson

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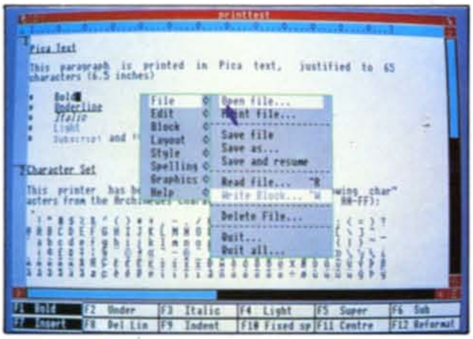

printtest
Pica Text
File
Edit
Block
Layout
Style
Spelling
Graphics
Help
Open file...
Print file...
Save file
Save as...
Save and resume
Read file... ^R
Write Block... ^W
Delete File...
Quit...
Quit all...
F1 Bold
F2 Under
F3 Italic
F4 Light
F5 Super
F6 Sub
F7 Insert
F8 Del Lin
F9 Indent
F10 Fixed sp
F11 Centre
F12 Reformat

Figure III: A multitude of file options

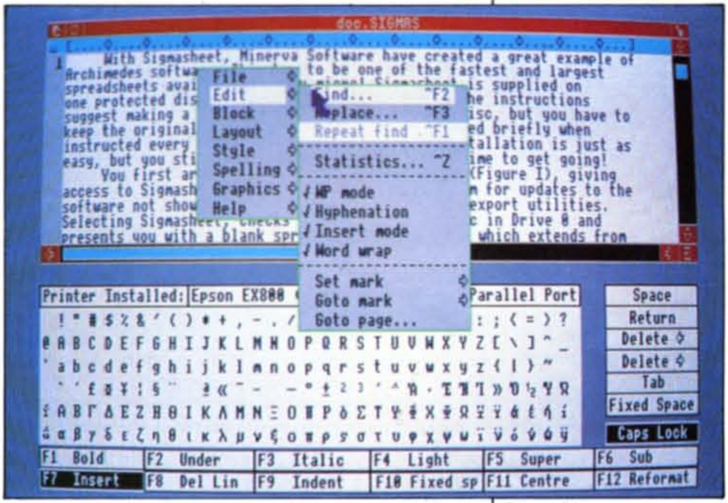

doc.SIGMAS
File
Edit
Block
Layout
Style
Spelling
Graphics
Help
Find... ^F2
Replace... ^F3
Repeat find ^F1
Statistics... ^Z
✓ WP mode
✓ Hyphenation
✓ Insert mode
✓ Word wrap
Set mark
Goto mark
Goto page...
Printer Installed: Epson EX800
Parallel Port
Space
Return
Delete
Delete
Tab
Fixed Space
Caps Lock
F1 Bold
F2 Under
F3 Italic
F4 Light
F5 Super
F6 Sub
F7 Insert
F8 Del Lin
F9 Indent
F10 Fixed sp
F11 Centre
F12 Reformat

Figure IV: Accessing the edit menu

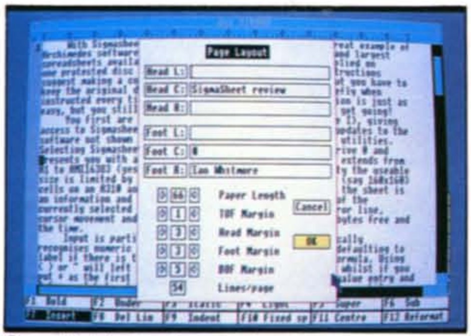
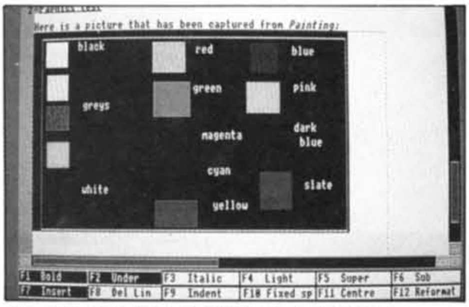

Page Layout
Head L:
Head C: SigmaSheet review
Head R:
Foot L:
Foot C: #
Foot R: Ian Whitmore
66 Paper Length
1 TOF Margin
3 Head Margin
3 Foot Margin
5 BOF Margin
54 Lines/page
Cancel
OK
F1 Bold
F2 Under
F7 Insert
F8 Del Lin
F9 Indent
F10 Fixed sp
F11 Centre
F12 Reformat

Figure V: Adjusting the page layout

◄ From Page 41

EX800 including colour dumps and NLQ. I also produced one that supports the Greek character set in the Archimedes – see Figure IV – so that if you type *COUNTRY GREECE before entering 1st Word Plus you get Greek on screen.

Earlier versions did not pause after each page – even when set to do so. Acornsoft have now fixed this and will exchange your master disc free of charge if you send it back to them. However other minor bugs remain including crashing when replacing ? with nothing and the replace fails with lines longer than 160 characters. Also Delete and Copy will not work across line ends if the ruler is wider than the screen.



Here is a picture that has been captured from *Painting:*

Figure VI: Including graphics in your document

Other irritating characteristics are the omission of multi-file options or case-swap functions and the annoying way that new styles often cancel out previously set options in the same area.

Although I've not looked at 1st Mail in depth, I am impressed by the package's mail merge facilities. It takes a master document in the *doc* directory and a datafile from *dat* – both created from 1st Word Plus – then performs a merge sending the result to the printer or a file in the *mrg* directory for editing or later printing. Once again the instructions are clear and include a tutorial session.

Overall, 1st Word Plus and 1st Mail are very good and offer a vast number of facilities. Both are easy to learn to use and although they cost a lot more than most word processors for the 8 bit BBC Micro, this package offers far more and is good value for money. When all the bugs are gone and the missing features incorporated it will be perfect.

Saying it in style

Getting the output looking right, Ian Whitmore tries . . .

Product: First Fonts
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Supplier: Ian Copestake Software, 10 Frost Drive, Wirral, Merseyside L61 4XL
Tel: 051-648 6287

IAN Copestake has been writing word processor orientated software for the Acorn market for some years and has now turned his hand to support for 1st Word Plus on the Archimedes. He has written a series of new printable fonts – including French, German, Greek and one for forms and stationery – which are also supported on screen.

The one reviewed here was M5T which is for mathematical and scientific symbols and printing on an Epson LQ printer, a NEC Pinwriter P2200, NEC P6 Plus/P7 Plus, Citizen HQP-40, Star LC24-10 with or without the optional ram card. Although many other nine pin printers are also catered for such as the Star LC10.

Three files are needed for each font/printer combination. You load two before calling 1st Word Plus, the onscreen font and a printer character definition program – the printer must be online when you load this one.

The third file is a printer driver and is called from within 1st Word Plus in the usual way by clicking over the driver title just above the character display and selecting the new driver from disc.

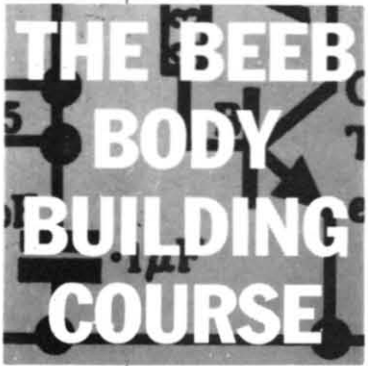
The bottom three lines of the screen display contain a whole collection of mathematical and scientific characters, all of which are selectable by clicking over them with the mouse or using a specific key combination, with the on screen cursor showing the position in the text where the character is to be inserted. Some are complete, some part symbols and some are in subscript and superscript already. They can be used in bold, underlined and italic form, but not sub or superscript.

All the normal characters, shown in the upper three lines, are available from the keyboard, as usual including super and subscript. They are output in the printer's Roman typeface, but the light text option uses the sans serif font.

The first seven characters in the second half of the display are printer codes allowing you to alter line spacing between 1/8 and 1/6 inch, select proportional spacing and the various justify options. These act in the proportional spacing mode and should not be used with the same options in 1st Word Plus.

Documentation consists of one sheet of A4 and a hints and tips booklet for those new to word processing. Perhaps the disc could have a boot file to load the two files needed first and could also have the printer driver in the right directory, though this omission is useful for hard disc users. However these are very minor niggles as in use this package performed well, giving clear easily readable printouts on an Epson LQ1000.

All in all these new fonts for the Archimedes certainly add a lot to an already worthwhile product.


THE BEEB BODY BUILDING COURSE

Putting on the brakes

Mike Cook shows how to drive his motor

OVER the last two months in this series on the Body Build Experimenter's Board we have looked at the shift register and timers. I set you the problem of simulating the action of a shift register using PB0 as the data input and PB1 as the clock. The solutions in Basic and Forth are shown in Listings I and II respectively.

These are fully described on the following pages and not only is simulating registers a useful exercise in programming but it makes you appreciate how much code the shift register hardware can replace. In addition, it can handle clock rates about 200 times faster than our simulation.

When you run the program you might notice something a little strange. If you connect wires to the data and clock inputs you will see the shift register bit pattern change as you touch the free ends of the wire. This illustrates an important effect – mains pickup.

What is happening is that your body is acting as an aerial and you are picking up the 50Hz signal radiated from the mains all about you. This effect would not exist if you were on board a sailing boat powering your micro from batteries in the middle of the Atlantic. For any readers in that condition I apologise for the following irrelevant explanation.

By touching the wire you are injecting this very small signal into the comparator and this is acting like a high gain amplifier feeding a 50Hz pulse waveform into the micro. It only works because the input to the comparator is of a very high impedance, so the very small amount of power you are picking up can develop a large enough voltage to turn it on.

You might not realise it, but there is a considerable difference between power and voltage – power is the result of multiplying the voltage by the current flowing. If you have a very high impedence – or resistance – you can't get much current flowing, so for a given amount of power you can develop a high voltage.

The pickup you can generate by simply sitting close to the mains can range from 5 to 50 volts. But don't worry: Every time you get a static shock from carpets it is in the order of a few thousand volts with no power behind it. Contrast this with the mains, where a shock of 250 volts can easily prove fatal: It is simply that the mains has the power to support the current that the voltage causes to flow – a current of a few milliamps is sufficient to be fatal. It is all neatly summed up in the old saying: *It's the volts that jolts but it's the mills that kills.*

If you want to stop mains being injected like this the best way is to lower the impedance of the input by using a pull-up resistor. Simply wire a resistor – the value is not critical, anything from 1K to 47K – from each of the inputs to the 5v line. They will then have a logic one on them and to make them have a logic zero simply touch them with a wire connected to the E – earth – line. Make sure you don't connect the E to the 5v, as this will short out the power supply and make the micro crash.

Measuring frequency

As promised in last month's issue, we're going to look at how you can make the timers measure frequency, but before that we need a source of frequency to measure. So let's move on to the motor on the board and see how to drive it. Remember that the techniques we shall be looking at can apply to all DC motors, not just that one – you can apply the same control techniques to your own buggy or other motorised device.

As it's a DC motor all you need to do is to put a DC voltage across it and off it goes. However the one on the board has a rating of 1.5v to 3v and although it will run happily off 5v it tends to go a little fast.

We can get about 2v to drive the motor from one of the amplifiers on the board. If we feed the voltage reference output – Rf out – into the DC amplifier – A3 in – we can use the amplifier's output – A3 out – to power the motor. We want a little control over it so the supply is connected

Turn to Page 44 ▶

The Body Build Experimenter's Board, first described in the August 1988 issue of *The Micro User*, enables you to learn about interfacing in a relatively painless way. It contains many components which can be interlinked to enable a wide variety of experiments to be performed.

```
 10 REM BODY BUILDING EXPERIMENT BOARD
 20 PRINT "Shift register"
 30 PRINT "Clock on PB1"
 40 PRINT "Data on PB0"
 50 PRINT "Displayed on the LED bars"
 60 ?&FE62=0   : REM B SIDE INPUTS
 70 ?&FE63=&FF : REM A SIDE OUTPUTS
 80 S%=0
 90 ?&FE61=0
100 REPEAT
110 PROC TRANS
120 S%=((S%*2) OR (T% AND 1)) AND &FF
130 ?&FE61=S%
140 UNTIL FALSE
150 END
160 DEF PROC TRANS
170 REM HOLD UNTIL HIGH
180 REPEAT
190 T%=?&FE60
200 UNTIL (T% AND 2)=2
210 REM HOLD UNTIL LOW
220 REPEAT
230 T%=?&FE60
240 UNTIL (T% AND 2)=0
250 ENDPROC
```

Listing I: The Basic shift register simulation

```
SCR = 5       5 H
  0 ( SHIFT REGISTER SIMULATOR )
  1 : ?CLOCK B.IN.READ DUP 1 ?BIT 0 = ;
  2 : TRANSITION 0
  3      BEGIN DROP ?CLOCK NOT UNTIL
  4      BEGIN DROP ?CLOCK UNTIL ;
  5 : SHIFT CONFIG.IN
  6    0 BEGIN 2* 255 AND TRANSITION
  7     1 AND OR DUP B.OUT AGAIN ;
  8
```

Listing II: The Forth shift register simulation

◄ *From Page 43*

through a relay to allow the motor to be turned on and off using bit 0 of the printer port.

The whole arrangement is shown in Figure I. Setting bit 0 turns the motor on and clearing it turns it off. Make sure the relays are enabled by making Link 1.

We've already seen how to turn bits on an off, so I won't repeat it here but try this experiment: Cut out a small piece of thin card about 46mm by 7mm, push a small sharp object through the centre to start a hole and then push it on the motor shaft. Make sure that the card passes through the opto slot and does not catch anywhere. Program two function keys – one to turn on the motor and the other to turn it off.

Now see what happens when you turn the motor on and then off. So – you may say – the motor goes on and off, what of it? Well, what happens is that when you switch the motor off it does not stop directly – it runs down. To make this a little clearer let's arrange for the opto switch to control the LED and feed into the speaker. Place Links 2 and 3 both in position B and connect a wire between connectors 7 and 6. Now whenever there is something in the opto slot the LED will go out and the speaker will click. Again turn the motor on

BASIC: The heart of the simulation is the procedure PROC-TRANS which waits for a cycle of the clock input. It consists of two loops: One that waits until the clock input is high and the other until it is low. In this way the procedure only returns on a high to low transition of the input clock signal.

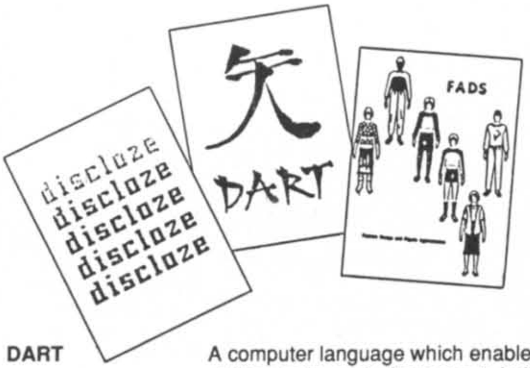
The variable *T%* is used to capture the state of the data input at the same time as the clock. Therefore when we exit the procedure it contains the data value at the time of the falling clock signal, just like the hardware shift register.

Every time the clock input makes a negative transition we have to shift the existing data – stored in *S%* – one place to the left, add in the new data and display the results. We also have to simulate the most significant bit falling off the end of the 8 bit shift register.

This is all achieved in line 120, which is easy to follow if you break it down into sections.

The part (S%*2) shifts the old data one place to the left, (T% AND 1) isolates the data from the other inputs on the port. Then ORing these two together merges them and finally, the whole lot is ANDed with &FF to restrict the results to eight bits.

How Listing I simulates the action of the shift registers



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and off, and note how long it takes to run down. What is happening is that when the power is removed the motor is spinning as it is only the motor's friction that causes it to slow down and stop. This is known as the flywheel effect. If we want the motor to stop immediately we will have to apply a brake. And fortunately we can apply an electric one.

When a permanent magnet motor like this is spinning freely it acts as a generator and we can put a mechanical load on it by putting an electrical load on its output. In short, to stop a motor we want not only to remove its power but also short it out. In this way we will put maximum load on the generator. This is known as flywheel braking and can be very effective.

As our relays are dual pole change over units, this is easily done. Wire up the board as shown in Figure II and note the difference when we turn it off – it stops almost dead.

This technique of flywheel braking can improve the accuracy and control that you can achieve with simple DC motors.

Now here is this month's task for you: Write a program to increment a count display every time the opto switch is cut. Make the program turn the motor on and then when it has run up to speed turn it off and count the number of times it revolves after it is turned off. The transition routines we looked at this month should help you. Remember you can read the state of the opto switch from bit 6 of the B side of the VIA. Answers next month in Basic and Forth.

● *Next month we will see how to control the direction of our motor and several ways of controlling its speed.*

FORTH: In Forth we can use words that we've already defined in earlier blocks, so make sure that blocks 1 to 4 have been loaded. The word ?CLOCK reads in the B side of the user port, duplicates the findings and tests bit 1 to see if it is a zero.

Thus this word exits with a logical value on top of the stack and the data read in under it. The word TRANSITION waits until the clock has produced a negative edge. As the ?CLOCK returns two values on the stack we want to get rid of the data if the loop is not terminated – this is done by DROP after BEGIN.

However the first time round the loop we have not executed ?CLOCK and so there is nothing on the stack to drop. Therefore we place a dummy number 0 on the stack at the start of the word definition. We perform the first loop until the clock input is not zero – or one – and then the second loop until it is zero. When we leave TRANSITION we will have the data when the clock fell on the top of the stack.

Finally SHIFT ties it all together – the initial state of the shift register is placed on the stack. Then we enter an infinite loop: It shifts what is on the stack and restricts it to eight bits, then we wait for the clock signal to fall. The data now on the stack is isolated from the other bits with the AND operation this is then added to our shift register value with the OR operation. Finally we make a copy of the shift register and display it.

How Listing II works

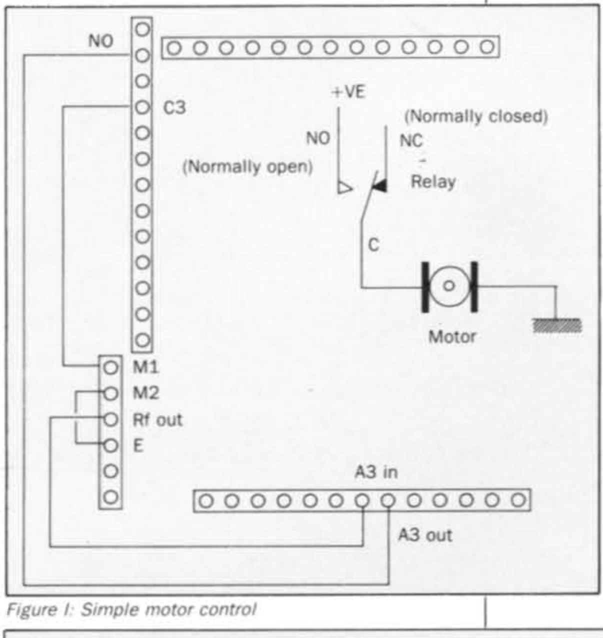

Figure I: Simple motor control

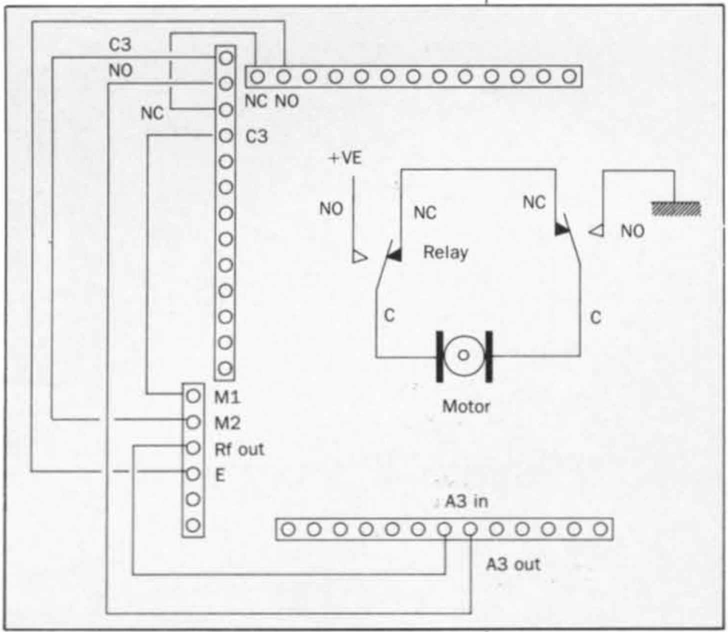

Figure II: Flywheel braking

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BEEBUG – The Archimedes Specialists

Threshold of a dream

Steve Turnbull starts a new series on the new OS from Acorn

ON November 11 1988 in a room in Acorn's training centre in Cambridge the company unveiled it's new operating system for the Archimedes – Risc OS. It was put through its paces, demonstrating once again the expertise of Acorn's software development team.

Where the Arthur OS was an adequate stopgap that gave access to the power of the Arm chip set, Risc OS takes BBC Micros firmly beyond any rivals in both performance and price.

In this short series – leading up to the official release of the software in April – we'll be looking at the facilities you get for your money and how to use them to best effect. So when you plug in the new roms you'll immediately be able to make the most of your acquisition.

Getting started

The first step is to insert the four new roms. Switch the machine off, remove the fixing screws – one on each side and three at the back – and slide the lid off. If you have any cards inserted you'll have to remove them to get at the sockets. The four operating system roms are in a line just behind the disc drive. Gently remove them by alternately levering with a screwdriver at either end until they come free.

The rom socket nearest the edge of the board is labelled Low and the furthest one is High and if you examine the new roms you can see they have sequential serial numbers. The lowest numbered one goes in the Low socket and the rest follow in order. Unlike the roms you removed – which were two pins short – the new ones fill the sockets completely.

And that's all you need to do – there are no links to move and nothing to solder. Now you can replace any expansion cards and the lid – but don't replace the screws until you have tested the system. When you switch on, the machine beeps as usual and should come up with the new DeskTop – if it doesn't, issue:

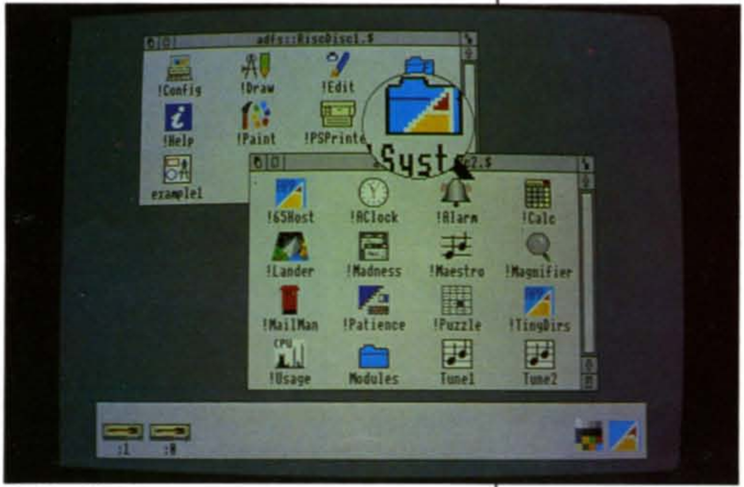
```
*CONFIGURE LANGUAGE 3
```

Switch off and on again. In the past you may have preferred to work from Basic – but from now on you'll only want the DeskTop.

Colourful windows

When you get into the DeskTop you are presented with a pleasant screen in grey tones with the icon bar a lighter shade along the bottom. The Archimedes logo sits in the bottom right with a 4x4 palette block next to it.

On the left-hand side is a floppy disc icon and if you have any other filing systems or storage devices configured – a second floppy, hard disc or Econet, for example – they will be here too. The floppy disc icon is much more detailed than before and the drive number is given below it.



The Risc OS desktop

Clicking the drive icon with Applications disc 1 in it brings up the root directory, but here's where the first real difference occurs. The on-screen pointer changes to an hourglass symbol – the sand actually moves from the top to the bottom while you wait – and there are a great number of disc accesses. Finally the directory window comes up, showing a very colourful set of icons.

What happens is that when a request to open a directory viewer is made the DeskTop looks at each file, determines its type and displays its internal icon for that type if it has one. If the file is a directory and its name starts with ! – such as !Writer – then it's an application and is further investigated for a file called !Sprites which contains the icons for the program itself and for any files which can be handled by it.

For example, on disc 1 there's a text editor called !Edit and this provides both its own icon and the one for any text files. Once the icon is loaded it is remembered for any future disc accesses until the machine is reset. However one of the most important features of the new operating system and the superb DeskTop is that you need to know very little about what it's doing in order to use it to the full.

● *Next month we'll be looking at using the DeskTop and its various features.*

Availability

The new Risc OS from Acorn will not be available until April and this series of articles has been written using a preview version. Also the disc software has not been finalised.

The new operating system, complete with four roms, two manuals and two discs packed with software, will be available for just under £30.

Check up on Checksums

Steve Turnbull unravels their inner most secrets

SINCE we first published the Checksum program in the June 1987 issue of *The Micro User* people have written in with the problems they've been having using the Basic generator program. To help this situation we began putting an all-singing all-dancing machine code version on to each monthly disc – unfortunately it's too long for the magazine. But in February 1988 we brought all the information together once and for all. We repeat it here in case you missed it.

Panel I shows how to produce Checksums using the Basic program, and Panel II shows the facilities available in the long machine code version.

The listing given with this article produces a much shorter machine code program that generates checksums without all the frills and it can stay resident in your micro to be called when you need it. So type in the listing and, using an older Get it Right!, make sure the checksums match – if you're not sure how to do this read Panel III – save the program and then run it. The code created and saved is the new checksum generating program.

You can automatically run this version from disc just by typing the command:

```
*xs
```

After this you can call it again with:

```
CALL&B00
```

No disc access is needed. To produce a printout of the checksums you'll need a Control+B before pressing the Return after *xs or the call. Or if you want the automatic paging facility use Control+N. To switch these off afterwards use Control+C and Control+O respectively.

If you are using the 6502 second or co-processor you should alter the program to run at &F600 by changing line 80 to read:

```
80 wrch=&FFEE:byte=&FFF4:code=&F600
```

It's used in the same way. To call it again use:

```
CALL&F600
```

I hope this finally clarifies the checksums and how you should use them.

Tape users

Save the program xs as described then to use it:

```
*LOAD xs B00
CALL &B00
```

All other instructions are the same as for disc users.

Type in the program in the June 1987 issue of *The Micro User* and save it as *BCheck*. Run it, then isolate and correct any typing errors you may have made.

Find out your normal PAGE setting using:

```
PRINT ~PAGE
```

This gives you a three or four digit hexadecimal number, that we'll represent with XXXX.

Now enter this sequence of instructions:

```
MODE 7
PAGE=&7000
LOAD"BCheck"
*KEY9"PAGE=&7000|MOLD|MRUN|M"
*KEY8"PAGE=&XXXX|MOLD|M"
PAGE=&XXXX
NEW
```

Your micro now has the BCheck program loaded and the function keys correctly set up, so you you can begin to type in the magazine listing, described in Panel III.

To run BCheck and generate the checksums just press f9. When they have been displayed you can return to your program using f8.

Panel I: Using the Basic checksum generator

This program is on all *The Micro User* monthly discs from December 1987 and must be loaded from disc each time it is run using:

```
*xsum
```

This generates checksums from the first to last line, it has automatic paging and can be interrupted by pressing the Escape key. There are several other variations on this command:

```
*xsum P
```

sends the complete list of checksums to the printer. You can specify start and end line numbers as well, in the same format as the LIST command:

```
*xsum 500,1000
*xsum 1540,
*xsum P 220,320
```

The final example will send the checksums of the specified line numbers to the printer.

When you specify the range of line numbers the cumulative checksum digit is still calculated from the complete program and so is still correct.

Panel II: The long machine code version

Get it right!

A STEP-BY-STEP GUIDE TO USING CHECKSUMS

Let's assume you've chosen to type in the game, Dune Hunter, from the November 1987 issue of *The Micro User*. You've switched on your micro and the magazine is open beside it:

- Type in 10 lines of the program then run whichever version of the checksum program you are using to produce the checksums for these first 10 lines.
- A checksum consists of four hexadecimal digits – sometimes three or two digits – in a group followed by a space and then a single digit called the cumulative digit.
- Compare each single cumulative digit of the last 10 lines displayed with the equivalent digit in the checksum list in the magazine.
- If they are all the same you know that you have made no errors so far, and you can safely type in the next 10 lines and repeat the check for these.
- When there is a difference in the cumulative digits, find the first one which differs. Either that line or the one before will contain a discrepancy between the magazine and what you have typed – the line that is different can be identified because the group of four digits listed by the program will be different to those in the magazine.

Some of the more common errors to watch out for are: Confusions between a lower-case L and the digit one, digit zero and capital O, or incorrect numbers of spaces between quotes and so on.

- Once you have found and corrected the difference you should re-do the checksums for that group of 10 lines so you can spot any other differences.
- Just keep repeating the enter, checksum and correction sequence until you've typed in the whole program, which will then run correctly first time, but always save it first.

Once you have become familiar and confident with the technique you can type in bigger chunks of the program before checking. In time you will be able to type in the whole program before using the checksums – but the checking method remains the same.

Panel III: How to use checksums

Archimedes checksums

A special generator was published in the January issue of *The Micro User*.

```
   10 REM Short Checksums
   20 REM by Steve Turnbull
   30 REM (c)  The Micro User
   40 MODE7:PROCinit:PROCassemble
   50 PROCos("SAVE xs "+STR$~code+" +200")
   60 END
   70 DEFPROCinit:newl=&FFE7
   80 wrch=&FFEE:byte=&FFF4:code=&B00
   90 rem=&F4:return=13:spc=32
  100 qts=ASC"""":colon=ASC":"
  110 comma=ASC",":Lbrk=ASC"["
  120 rbrk=ASC"]":mcom=ASC"\"
  130 Lcrc=&70:ocrc=&72:wcrc=&74
  140 Lptr=&76:crcptr=&78:Lnum=&7A
  150 LLen=&7C:Ltmp=&7D:txtptr=&7E
  160 nmbase=&80:Lonum=&81:hinum=&82
  170 Lowrk=&83:hiwrk=&84:qflg=&85
  180 codeflg=&86:savebyt=&87
  190 fldsize=&88:zflg=&89:Lend=&8A
  200 escflg=&FF:ENDPROC
  210 DEFPROCassemble
  220 FOR L%=0 TO 2 STEP 2
  230 P%=code:[OPT L%
  240 .check LDA #0:STA codeflg:STA ocrc
  250  STA ocrc+1:LDA #131:JSR byte
  260  STX Lptr:STY Lptr+1
  270 .start JSR newl
  280 .while BIT escflg:BMI escape
  290  LDY #1:LDA (Lptr),Y:BPL doline
  300 .wayout RTS:.escape BRK:BRK
  310  OPT FNs("Escape"):BRK
  320 .bad BRK:BRK
  330  OPT FNs("Bad program"):BRK
  340 .doline LDA #0:STA Lcrc:STA Lcrc+1
  350  STA qflg:TAY:LDA (Lptr),Y
  360  CMP #&0D:BNE bad:INY:LDA (Lptr),Y
  370  STA Lnum+1:INY:LDA (Lptr),Y
  380  STA Lnum:INY:LDA (Lptr),Y
  390  STA Lend:JSR prescan:CPY #5
  400  BCC display:LDY #4
  410 .skipspc LDA (Lptr),Y:CMP #spc
  420  BNE scan:INY:CPY LLen
  430  BEQ display:BNE skipspc
  440 .scan LDA (Lptr),Y:JSR dobyte
  450  INY:CPY LLen:BCC scan
  460 .display:LDX Lnum:LDY Lnum+1
  470  JSR pdec:LDA #spc:JSR wrch
  480  LDA #ASC"=":JSR wrch:LDA #spc
  490  JSR wrch:LDX Lcrc:LDY Lcrc+1
  500  JSR phex:LDA ocrc:JSR lastchk
  510  LDY LLen:CPY Lend:BEQ newline
  520  LDA #ASC"*":JSR wrch
  530 .newline JSR newl
  540 .update CLC:LDA Lptr:ADC Lend
  550  STA Lptr:BCC unwhile:INC Lptr+1
  560 .unwhile JMP while
  570 .prescan LDY Lend
  580 .psLoop DEY:LDA (Lptr),Y:CMP #spc
  590  BEQ psLoop:INY:STY LLen:RTS
  600 .dobyte STA savebyt:CMP #qts
  610  BNE notqe:PHA:LDA qflg:EOR #&FF
  620  STA qflg:PLA
  630 .notqe BIT qflg:BMI skpcode
  640  BIT codeflg:BMI jcode
  650  JSR basic:JMP skpcode
  660 .jcode JSR mcode
  670 .skpcode LDA savebyt:CPY LLen
  680  BEQ skipcrc:STY Ltmp:LDX Lcrc
  690  LDY Lcrc+1:JSR docrc:STX Lcrc
  700  STY Lcrc+1:LDX ocrc:LDY ocrc+1
  710  JSR docrc:STX ocrc:STY ocrc+1
  720  LDY Ltmp:.skipcrc RTS
  730 .basic CMP #rem:BEQ skpline
  740  CMP #Lbrk:BNE xbasic:LDA #&FF
  750  STA codeflg:RTS
  760 .skpline LDY LLen:.xbasic RTS
  770 .mcode CMP #mcom:BEQ skipcom
  780  CMP #rbrk:BNE xmcode:LDA #0
  790  STA codeflg:.xmcode RTS
  800 .skipcom LDA qflg:PHA:LDA #0
  810  STA qflg
  820 .skpLoop INY:LDA (Lptr),Y:CMP #qts
  830  BNE skpchk:PHA:LDA qflg:EOR #&FF
  840  STA qflg:PLA
  850 .skpchk CPY LLen:BEQ skpexit
  860  CMP #colon:BNE skpLoop:BIT qflg
  870  BMI skpLoop
  880 .skpexit PLA:STA qflg:LDA (Lptr),Y
  890  STA savebyt:RTS
  900 .docrc PHA:STX wcrc:STY wcrc+1
  910  EOR wcrc+1:STA wcrc+1:LDX #7
  920 .crclp BIT wcrc+1:CLC:BPL crcskp
  930  LDA wcrc:EOR #&10:STA wcrc
  940  LDA wcrc+1:EOR #&08:STA wcrc+1
  950  SEC
  960 .crcskp ROL wcrc:ROL wcrc+1:DEX
  970  BPL crclp:LDX wcrc:LDY wcrc+1
```

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```
 980  PLA:RTS
 990 .lastchk PHA:LDA =spc:JSR wrch
1000  PLA:AND =&0F:[illegible]X:LDA [illegible]&FF:PHA
1010  TXA:JMP notz:.pdec LDA =10
1020  BNE pnum:.phex LDA =16
1030 .pnum STX Lonum:STY hinum
1040  STA nmbase:LDA =4:STA fldsize
1050  LDA =255:STA zflg
1060 .nbit PHA:LDA =0:STA Lowrk
1070  STA hiwrk:LDX =16
1080 .next ASL Lonum:ROL hinum
1090  ROL Lowrk:ROL hiwrk:LDA Lowrk:SEC
1100  SBC nmbase:TAY:LDA hiwrk:SBC =0
1110  BCC done:INC Lonum:STY Lowrk
1120  STA hiwrk:.done DEX:BNE next
1130  LDA Lowrk:DEC fldsize:BNE nbit
1140 .out TAX:BNE notz:PLA:PHA:PHP:TXA
1150  PLP:BMI notz:BIT zflg:BPL notz
1160  LDA =spc:BNE digout
1170 .notz LDX =0:STX zflg:CMP =10
1180  BCC add:ADC =6:.add ADC =48
1190 .digout JSR wrch:PLA:BPL out
1200 .exit RTS:]:NEXT:ENDPROC
1210 DEFFNs(s$):$P%=s$:P%=P%+LEN$P%:=L%
1220 P%=P%+LEN$P%:=L%
1230 DEFPROCos($&700):LOCAL X%,Y%
1240 Y%=7:CALL&FFF7:ENDPROC
```

Get it right!

```
  10 =    0 0
  20 =    0 0
  30 =    0 0
  40 = 236A A
  50 = 657A A
  60 = FD2E 7
  70 = 5B0A D
  80 = 4F15 B
  90 = 245B B
 100 = 70B9 9
 110 = EBDD 4
 120 = 1687 1
 130 = A0BB B
 140 = D695 4
 150 = A59F 4
 160 = 4D12 7
 170 = 4D1F 4
 180 = 5ED5 C
 190 = 97FD 8
 200 = 55AA E
 210 = 98E9 0
 220 = AAB9 5

 230 = 7CBB D
 240 = 7334 F
 250 = F159 9
 260 = A5F0 C
 270 = 9A6D 6
 280 = FB52 4
 290 = A2DC 8
 300 = AA8E C
 310 = 82B5 3
 320 = 166B C
 330 =  E73 6
 340 = E3C5 3
 350 = 6D40 4
 360 = E3D6 1
 370 = C6C5 C
 380 = 144F 0
 390 = B381 0
 400 = D3BA F
 410 = 7E1A 5
 420 = DDEC 7
 430 = 51FF 8

 440 = 2C54 4
 450 = 7C07 2
 460 = A2F9 9
 470 = 1D3A 6
 480 = 2A1F 4
 490 = 8D0F 1
 500 =  A69 9
 510 =  952 F
 520 = 8D9D A
 530 = 109C F
 540 = 4312 1
 550 = D4A9 9
 560 = 1606 D
 570 = D100 1
 580 = 7B1C 6
 590 =  573 6
 600 = EFB2 B
 610 = 12CE A
 620 = D058 1
 630 = A3C3 B
 640 = 8BC6 D
 650 = 1092 2
 660 = 9D39 0
 670 = CF23 6
 680 = D7F4 F
 690 = 8759 9
 700 = 49F2 9

 710 = 9CF9 0
 720 = 521B D
 730 = 4F47 8
 740 = 1303 2
 750 = 28AA 6
 760 = 73F4 1
 770 = FCEC A
 780 = 1CC4 6
 790 = F2AF 3
 800 = B7B3 5
 810 = 4048 C
 820 = C795 A
 830 = 59D6 7
 840 = D058 2
 850 = 19FA 2
 860 = 24EC C
 870 = D682 9
 880 = 217E D
 890 = A331 F
 900 = 3A8E 2
 910 = 3CEB 0
 920 = 9556 8
 930 = FD54 5
 940 = 16CE 5
 950 = 8D00 9
 960 = FC1F C
 970 = A74E 2

 980 = EC5C 6
 990 = 1CF2 7
1000 = 6066 6
1010 = D1F8 F
1020 = 8693 D
1030 = 6D46 3
1040 = 2284 1
1050 = 48E4 7
1060 = 4FFE 7
1070 = 72EC 5
1080 = FF8D 4
1090 = 664B 6
1100 = 1E51 C
1110 = 444B F
1120 = 4F4F A
1130 = 9E0D B
1140 = 5029 6
1150 = 3A1B E
1160 = 5B26 5
1170 = EE96 2
1180 = F3D2 3
1190 = 27C9 3
1200 = 4ED4 3
1210 = 17F3 E
1220 = 51B2 E
1230 = 86D7 B
1240 = 50E0 0
```

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Peter Harris knows how to find programmes quickly

MOST position indicators on audio and video tape recorders count the number of turns made by one or other of the tape spools. This means that there is no simple relationship between the number on the tape counter and the playing time left on the tape. No one relishes the task of trying to find a programme that they have recorded just after a two hour film, but help is now at hand.

TapeTim is a routine that returns a table of counts for 5 or 10 minute intervals on a tape from just two measurements made at around half-way and the end of the tape.

Type the program in, check it with Get it Right! and save it. Then run it and follow the on-screen prompts to create your personal tape index. You have to enter two pairs of values – time and counter – for the program to work.

The choice is yours, but bear the following in mind: Two values at the start of the tape, say 10 minutes apart, will stop the program working as the method of calculation used will take hours to work out the higher counter points. In fact any data pairs which are close together give inaccurate results.

The further apart on the tape the measuring positions are, the better the results – the ideal values being near the beginning and end. So put on the tape, rewind it then reset the counter. Play the tape for 10 minutes and record the counter position, then wind it through to the end and record the final position. For the best accuracy you could have the tape play through normally and do something else while it's busy.

For the mathematically inclined, the routine uses the fact that the spiral of tape may be considered as a series of concentric circles, since it is so thin relative to the radius. Therefore the running time is proportional to the sum of the circumferences of the circles to that point.

The program may be used with both audio and video tapes, but needs to be run for each different length and recorder – we've found that there is not much difference between brands.

```
   10 REM TapeTim3
   20 REM by Peter Harris
   30 REM (c) The Micro User
   40 INPUT"Count 1:"C1%TAB(15,VPOS-1)"T
ime 1:"T1%
   50 INPUT"Count 2:"C2%TAB(15,VPOS-1)"T
ime 2:"T2%
   60 INPUT'"Length of tape (mins):"L%
   70 PRINT"Output to printer? (Y/N) ";
   80 REPEAT A$=CHR$(GETAND&5F)
   90 UNTIL INSTR("YN",A$)>0:PRINTA$
  100 IF A$="Y" VDU2
  110 PROCsimul(C1%^2,C1%,T1%,C2%^2,C2%,
T2%)
  120 A=X:B=Y
  130 PRINT'"A=";A'"B=";B'
  140 IF L%>60 I%=10 ELSE I%=5
  150 IF INSTR("Yy",A$) VDU2
  160 PRINT'"Tape length ";L%" mins"'
  170 FOR N%=I% TO L% STEP I%
  180 count%=FNcount(N%,A,B)
  190 PRINT N%" mins",count%
  200 NEXT:VDU3:END
  210 DEFFNcount(time,A,B)
  220 LOCAL C,K:K=C2%/T2%:C=time*K
  230 REPEAT T=(A*C+B)*C:C=C+(time-T)*K
  240 UNTIL ABS(time-T)<0.01:=INT(C+.5)
  250 DEFPROCsimul(a1,b1,c1,a2,b2,c2)
  260 LOCAL K:K=a1*b2-b1*a2
  270 X=(c1*b2-b1*c2)/K
  280 Y=(a1*c2-c1*a2)/K:ENDPROC
```

Get it right!

```
 10 =      0 0   110 = 2CD9 5   210 = FEBB D
 20 =      0 0   120 = 9CC7 9   220 = 378C 1
 30 =      0 0   130 = D273 B   230 = 9C94 B
 40 = E223 3     140 = B5BF 9   240 = 72A8 0
 50 = 2B7A 9     150 = E255 F   250 = E661 4
 60 = C9A4 A     160 = E0E9 5   260 = BA88 C
 70 = A635 7     170 = 590F 2   270 = 6432 E
 80 = E46F 4     180 = 7A56 F   280 =  21D 0
 90 = 15F3 0     190 = 49C9 B
100 = 4DB6 9     200 = 54BA 5
```

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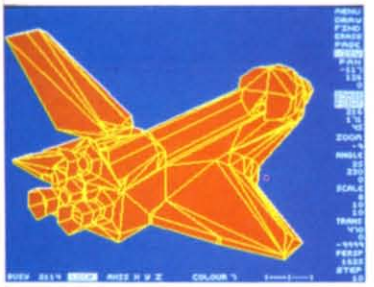

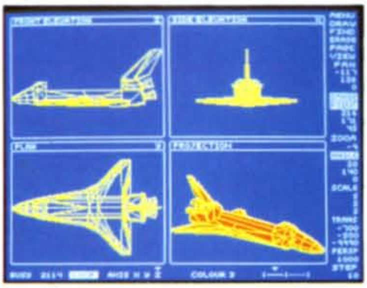

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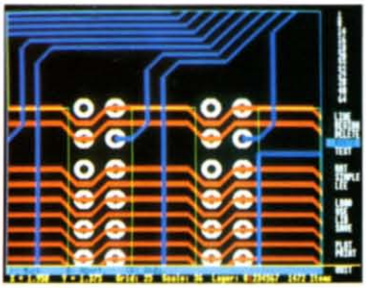

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Tabs on time

Keeping track of your tasks made easy by Ian Summers

IF you're lucky enough to use a Z88 you will probably be wondering how you ever managed without it. The diary is a very useful utility for logging time spent on various activities, but it doesn't automatically include time of day – and adding everything up when a project is finished is a real chore. But the Z88 has an internal clock and you can easily have a Basic program running while you're working on something else – hence the Logger.

This simple utility can be used to keep a close track of time spent on a large number of different projects – it never stops running and its data is kept saved in a file so the information is not lost even with a soft reset.

Type the program into your Z88 – or enter it on your BBC Micro and transfer it across. Make sure you save it before you start. Type RUN and you never need to stop it because all its functions are available from the main menu and the Z88 index can be accessed as normal by pressing ☐I.

To use Logger just decide what project or application you are going to work on next and also the activity within that application, and enter this information at the prompts – the date and time are taken care of automatically. If you change your mind halfway through, enter END at either the application or activity prompt.

Whenever you want to take a break from logging press B at the main menu. Also, the last few entries can be edited by pressing E. This is very useful if you forget to tell Logger that you're taking a break for lunch, for example. You simply press B when you get back and edit the time to when you actually started your break. The log file can be cleared by pressing C, and press Escape to change the log file. Entering END at the new file prompt will make the program stop.

The option to print the log is activated by P. This creates a file for you to load in to PipeDream for printing later – for long logs this may take a few minutes. Be patient and you will be provided with a document with the same file name as the log but ending in an L. When you request a print of the log all the entries are grouped together according to the application name that you have given them.

Line 80 contains several variables that you may want to modify. If there are insufficient applications try increasing *mx*. The device and directory where the log files are stored can be changed from the default :RAM.0/ by changing the value of *Dr$*. As the program stands all entries that begin after 6:30 pm will be flagged with a ^ as possible overtime. By altering the values of *O* and *O$* it is possible to change both the time and the symbol.

POSSIBLE PITFALLS

Don't call your application anything beginning with an asterisk or it will be ignored. Don't include any commas in filename, application or activity. Any activity that lasts less than a minute will be ignored but the time will be added to the application total.

Don't delete the file called Control. If you must tamper with the log file press Escape and specify the same log file – it's not possible to edit any entries that were entered before pressing Escape.

```
   10 REM LOGGER
   20 REM By Ian Summers
   30 REM (c) The Micro User
   40 PROCset
   50 PROCof
   60 REPEAT:PROClg:UNTILFALSE
   70 DEFPROCset
   80 mx%=40:Dr$=":RAM.0/":O%=18.5*3600:
O$="^":REM personalisation items
   90 ONERRORCLOSE#0:IFERR=17CLS:GOTO50
ELSE IFERR=252PROCnr:GOTO60 ELSE REPORT:
PRINT" at line "ERL:END
```

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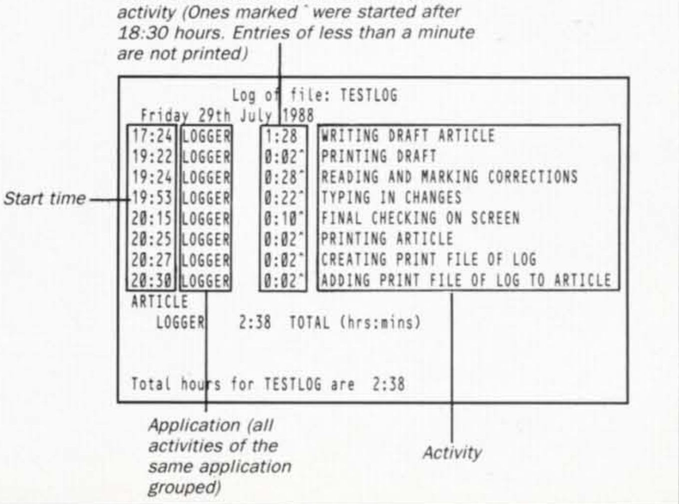
Hours and minutes taken to accomplish activity (Ones marked ^ were started after 18:30 hours. Entries of less than a minute are not printed)

```
            Log of file: TESTLOG
  Friday 29th July 1988
 17:24 LOGGER    1:28   WRITING DRAFT ARTICLE
 19:22 LOGGER    0:02^  PRINTING DRAFT
 19:24 LOGGER    0:28^  READING AND MARKING CORRECTIONS
 19:53 LOGGER    0:22^  TYPING IN CHANGES
 20:15 LOGGER    0:10^  FINAL CHECKING ON SCREEN
 20:25 LOGGER    0:02^  PRINTING ARTICLE
 20:27 LOGGER    0:02^  CREATING PRINT FILE OF LOG
 20:30 LOGGER    0:02^  ADDING PRINT FILE OF LOG TO ARTICLE
 ARTICLE
    LOGGER    2:38  TOTAL (hrs:mins)


 Total hours for TESTLOG are  2:38
```

Start time

Application (all activities of the same application grouped)

Activity

An example log

◄ From Page 53

```
  100 DIM A$(mx%),T%(mx%),M$(12),D%(12),
DY$(7),SC%(7),AP$(7),AC$(7),PO%(7):D$=""
:dy$=FNdy:@%=0:st$="New..."+STRING$(6,"
"):lf$="the log file":a$=CHR$1
  110 C$=a$+CHR$67:F$=a$+CHR$70:R$=a$+CH
R$82:B$=a$+CHR$66:PB$="%H2%":U$=a$+CHR$8
5:S$=a$+CHR$84:IP$="%H4%":Z$=CHR$7:gp$=C
HR$13+CHR$10+CHR$10
  120 PROCls:PROCze:D%(0)=0
  130 FOR M%=1TO12:READM$(M%),D%(M%):D%(
M%)=D%(M%)+D%(M%-1):NEXT
  140 DATAJanuary,31,February,28,March,3
1,April,30,May,31,June,30,July,31,August
,31,September,30,October,31,November,30,
December,31
  150 CLS:PRINTR$S$" Welcome to LOGGER "
R$S$" (C) Ian Summers 1988""S$"Last use
d... "S$B$ld$" "FNrt;B$:ENDPROC
  160 DEFPROCls:REPEAT: P=OPENIN(Dr$+"Co
ntrol"):IFP UNTILTRUE ELSEPROCss("New","
NewLog",0,"New","New",TRUE):UNTILFALSE
  170 INPUT#P,Fn$,ld$,tm$,AP$,AC$,st$:tm
%=VAL(tm$):CLOSE#P:ENDPROC
  180 DEFPROCof:VDU1,127,1,67,1,83:F=OPE
NUP(Dr$+Fn$):IFF=0GOTO200
  190 EX%=EXT#F:PRINT "File "B$Fn$B$" no
w has "R$EX%R$" characters":CLOSE#F
  200 REPEAT: Nn$=FNnew("What log file n
ame is to be used ",B$+Fn$+B$,11)
  210 IF Nn$ = "" THEN Nn$ = Fn$
  220 IF Nn$ = "END" PROCer("Enter RUN "
+a$+CHR$225+" at '>' prompt"):END
  230 PRINT "Log will "FNcheckex(Nn$)"
"B$Dr$Nn$B$"":INPUT "Do you wish to cha
nge the log file name (Y/N)";an$
  240 IF an$ = "END" END
  250 UNTIL an$ <> "y" AND an$ <> "Y"
  260 IF nn=FALSE new=OPENOUT(Dr$+Nn$):l
d$="NEW":CLOSE#new
  270 PROCss(ld$,Nn$,FNtm,AP$,AC$,TRUE):
PROCls:IFnn=FALSE OR EX%=0 ENDPROC
  280 PROCze:CLS:PRINT"Calculating...":F
=OPENIN(Dr$+Fn$):PRINTTAB(0,2)"Finding e
nd of file ";:REPEAT:EX%=PTR#F:INPUT#F,T
EST$:PRINTTAB(20,2)EX%;:UNTILEOF#F OR TE
ST$="*END*":IFTEST$<>"*END*"EX%=EXT#F
  290 CLOSE#F:ENDPROC
  300 DEFFNdy:dy$=TIME$:=MID$(dy$,1,LENd
y$-10)
  310 DEFFNtm:tm$=RIGHT$(TIME$,8):hr%=VA
L(LEFT$(tm$,2)):mn%=EVAL(MID$(tm$,4,2)):
sc%=EVAL(RIGHT$(tm$,2)):=sc%+(mn%+(hr%*6
0))*60
  320 DEFFNrt:t%=tm%MOD(24*3600):hr%=t%
DIV 3600:mn%=(t%-hr%*3600) DIV 60
  330 sc%=(t%-hr%*60) MOD 60
  340 IF hr%<10 tm$="0" ELSE tm$=""
  350 tm$=tm$+STR$hr%+":"
  360 IFmn%<10 THEN tm$=tm$+"0"
  370 tm$=tm$+STR$mn%+":"
  380 IFsc%<10 THEN tm$=tm$+"0"
  390 tm$=tm$+STR$sc%:=tm$
  400 DEFFNHR(tm%):hrs%=tm%DIV3600:T$=ST
R$(hrs%):T$=STRING$(4-LENT$," ")+T$+":":
mn%=(tm%-hrs%*3600)/60:IFmn%<10T$=T$+"0"
+STR$(mn%)ELSET$=T$+STR$(mn%)
  410 =T$
  420 DEFFNdate(dy$):p%=0:REPEAT:p%=p%+1
:UNTILMID$(dy$,p%,1)=" ":q%=p%:REPEAT:q%
=q%+1:UNTILMID$(dy$,q%,1)>"9":q%=q%-1:r%
=q%+3:REPEAT:r%=r%+1:UNTILMID$(dy$,r%,1)
=" ":s%=r%+1
  430 REPEAT:s%=s%+1:UNTILMID$(dy$,s%,1)
=",":dy%=VAL(MID$(dy$,p%+1,q%-p%)):mh$=M
ID$(dy$,q%+4,r%-q%-4):mh%=0
  440 REPEAT:mh%=mh%+1:UNTILmh$=M$(mh%):
yr%=VAL(MID$(dy$,r%+1,s%-r%-1))-1988:an%
=yr%*365+D%(mh%-1)+dy%-1:an%=an%+yr%DIV4
:IFmh%<3ANDyr%MOD4=0an%=an%-1
  450 =an%
  460 DEFPROClg:IF nn CLS:PRINT S$"Last
session... "S$B$ld$" "tm$B$" "R$AP$R$" "
B$AC$B$"
  470 REPEAT:CLS:tm$=FNrt:PRINT R$S$" "s
t$S$R$B$ld$" "tm$B$" "R$AP$R$" "B$AC$B$T
AB(13,1)R$S$" Menu "R$S$TAB(13,2)R$" B
R$" will cause a break in logging"TAB(13
)R$" C "R$" will clear "lf$"R$S$;
  480 PRINT " Log file "R$S$SPC3R$" E "R
$" to edit the last few entries of "lf$"
SPC13R$" P "R$" will print "lf$"R$S$" Ti
me "R$S$SPC7R$S$"ESC"R$S$" to start a ne
w log""SPC13R$" Select from menu or pres
s any other key to log change in ";
  490 PRINT "application/activity "R$C$T
AB(0,5)S$Fn$S$
  500 REPEAT:G=INKEY(0):IFG>0G=G AND&5F
  510 tm%=FNtm:PRINTS$TAB(0,7)FNrt S$;:U
NTILG>0:PRINTTAB(0,8)C$:IF G = ASC("B")
THEN st$="Break in... ":PRINT:PROClog("*
BREAK*","<",FALSE):UNTILFALSE
  520 IFG=ASC("C")PROCclear:UNTILFALSE
  530 IFG=ASC("P")PROCpr:UNTILFALSE
  540 IFG=ASC("E")PROCed:UNTILFALSE
  550 NP$=FNnew("Application  ",R$+AP$+R
$,9):IF NP$ = "END" CLS:UNTILFALSE
  560 NT$=FNnew("Activity"+STRING$(5," "
),B$+AC$+B$,42)
  570 IFNT$ = "END" CLS:UNTILFALSE
  580 IF NP$ <> "" THEN AP$=NP$
  590 IF NT$ <> "" THEN AC$=NT$
  600 IF AP$="" OR AC$="" THEN CLS:PROCe
r("You must enter an application and act
ivity"):UNTILFALSE
  610 st$="Logging...  ":CLS:PROClog(AP$
,AC$,fg):UNTILFALSE:ENDPROC
  620 DEFFNnew(ty$,df$,ln%):REPEAT:PRINT
 'ty$"(DEFAULT="df$") up to "ln%" charac
ters""STRING$(ln%+2,".")"<"a$CHR$225STRI
NG$(ln%+6,CHR$8);:INPUTnew$:IFLENnew$>ln
%VDU7:UNTILFALSE ELSE UNTILTRUE:=new$
  630 DEFPROCed:REPEAT:CLS:FORPN%=6TO0ST
EP-1:tm%=SC%(PN%)MOb(24*3600):PRINTR$" "
PN%+1" "R$;:IFAP$(PN%)<>""PRINTS$DY$(PN%
)TAB(38)LEFT$(FNrt,5)S$" "R$AP$(PN%)R$"
"B$AC$(PN%)B$ELSEPRINT
  640 NEXT:PRINTR$" Enter the number to
edit an entry or "a$CHR$225" to make cha
nges and return to main menu "R$" ";:REP
EAT:G=GET:UNTILINSTR("1234567"+CHR$13,CH
R$G)
  650 IFG=13UNTILTRUE:PROCRe:ENDPROC
  660 PRINTTAB(0,7)SPC80;:G=G-49:REPEAT:
CLS:PRINTR$SPC3S$DY$(G%)" "S$R$:tm%=SC%(
G):PRINTR$" A "R$LEFT$(FNrt,5)'R$" B "R$
AP$(G)'R$" C "R$AC$(G)'R$" Which attribu
te of the entry do you want to change ("
a$CHR$225" for no changes) "R$" ";
  670 REPEAT:H=GET:UNTILH-64>0ANDH-64<4O
RH=13:IFH=13UNTILTRUE:UNTILFALSE
  680 ONH-64GOTO690,740,780
  690 tm%=FNtm:PRINT'R$" Currently "LEFT
$(FNrt,5)" "R$" How many minutes do you
want to add to time (use '-' to take awa
y) ";:INPUT MN%:SS%=SC%(G)+MN%*60
  700 IFSS%<SC%(G+1)PRINTCHR$7R$" You ca
nnot move the time to before that of the
 previous entry "R$" Press a key":IFGET:
UNTILFALSE
  710 IFG>0IFSS%>SC%(G-1)PRINTCHR$7R$" Y
ou cannot move the time to after that of
 the next entry "R$" Press a key":IFGET:
UNTILFALSE
  720 IFG=0ANDSS%>FNdate(FNdy+",")*24*36
00+FNtm PRINTCHR$7R$" You cannot move th
e time to after the current time "R$" Pr
ess a key":IFGET:UNTILFALSE
  730 SC%(G)=SS%:UNTILFALSE
  740 NP$=FNnew("New application ",R$+AP
$(G)+R$,9):IFNP$=""NP$=AP$(G)
  750 IFNP$="END"UNTILFALSE
  760 IFG=0ANDAP$<>""AP$=NP$
  770 AP$(G)=NP$:UNTILFALSE
  780 NT$=FNnew("New activity ",B$+AC$(G
)+B$,42):IFNT$=""NT$=AC$(G)
  790 IFNT$="END"UNTILFALSE
  800 IFG=0ANDAP$<>""AC$=NT$
  810 AC$(G)=NT$:UNTILFALSE:ENDPROC
  820 DEFPROCRe:PROCts(400):PO%=7:REPEAT
PO%=PO%-1:IFPO%=-1UNTILTRUE ELSEUNTILPO%
(PO%)>-1
  830 IFPO%=-1ENDPROC
  840 CD$=DY$(PO%+1):F=OPENUP(Dr$+Fn$):P
TR#F=PO%(PO%):FORPN%=PO%TO0STEP-1
  850 IFAP$(PN%)=""GOTO890
  860 PO%(PN%)=PTR#F
  870 IFDY$(PN%)<>CD$ORPTR#F=0CD$=DY$(PN
%):PRINT#F,DY$(PN%)
  880 PRINT#F,STR$(SC%(PN%)):PRINT#F,AP$
(PN%):PRINT#F,AC$(PN%)
  890 NEXT:EX%=PTR#F:PRINT#F,"*END*":CLO
SE#F:ENDPROC
  900 DEFPROCts(sz%):CLS:PRINTS$"Calcula
ting..."S$;:F=OPENOUT(Dr$+"Dummy"):FORDZ
%=1TOsz%/2:PRINT#F,"T":NEXT:CLOSE#F:OSCL
I"*ERASE "+Dr$+"Dummy":ENDPROC
  910 DEFPROClog(ap$,ac$,fg):PROCts(100)
:F=OPENUP(Dr$+Fn$):IF F=0 THEN PROCer("L
og file has dissappeared"):END
  920 PTR#F=EX%:EP%=PTR#F:dy$=FNdy
  930 IF dy$<>ld$ THEN PRINT#F,dy$
  940 ld$=dy$:tm%=FNdate(dy$+",")*24*360
0+FNtm:PRINT#F,STR$(tm%):PRINT#F,ap$:PRI
NT#F,ac$:EX%=PTR#F:PRINT#F,"*END*":CLOSE
#F:PROCss(dy$,Fn$,tm%,ap$,ac$,fg):FORPN%
=6TO0STEP-1
  950 DY$(PN%+1)=DY$(PN%):SC%(PN%+1)=SC%
(PN%):AP$(PN%+1)=AP$(PN%):AC$(PN%+1)=AC$
(PN%):PO%(PN%+1)=PO%(PN%):NEXT
  960 DY$(0)=dy$:SC%(0)=tm%:AP$(0)=ap$:A
C$(0)=ac$:PO%(0)=EP%:ENDPROC
  970 DEFPROCss(dy$,Fn$,tm%,ap$,ac$,fg)
  980 IFfg=FALSE ap$=AP$:ac$=AC$
  990 F=OPENOUT(Dr$+"Control")
 1000 IF F=0 THEN PROCer("Log control fi
le has dissapeared"):END
 1010 PRINT#F,Fn$:PRINT#F,dy$:PRINT#F,ST
R$(tm%):PRINT#F,ap$:PRINT#F,ac$:PRINT#F,
st$:CLOSE#F:ENDPROC
 1020 DEFFNcheckex(F$):ex=OPENIN(Dr$+F$)
:IF ex nn=TRUE:EX%=EXT#ex:CLOSE#ex:="be
added to the "+B$+"existing"+B$+" file"
 1030 nn=FALSE:CLOSE#ex:= "begin a "+B$+
"new"+B$+" file called"
 1040 DEFPROCclear:CLS:PRINT "Do you rea
lly want to clear "lf$" "B$Fn$B$" (Y/N)"
;:INPUT an$:IF an$ = "Y" OR an$ = "y" TH
EN PROCclearf ELSE PROCer("File "+Fn$+"
still intact!"):ENDPROC
 1050 ld$="Cleared":PROCss(ld$,Fn$,FNtm,
AP$,AC$,TRUE):PROCze:ENDPROC
 1060 DEFPROCze:AP$="":AC$="":FORPN%=0TO
7:DY$(PN%)="":SC%(PN%)=0:AP$(PN%)="":AC$
(PN%)="":PO%(PN%)=-1:NEXT:EX%=0:ENDPROC
 1070 DEFPROCclearf:C%=OPENOUT(Dr$+Fn$):
CLOSE#C%:PROCer("Log file "+B$+Fn$+B$+"
cleared"):ENDPROC
 1080 DEFPROCpr:CLS:PRINTS$"Calculating.
.."S$:PROCts(30):tm%=FNdate(dy$+",")*24*
3600+FNtm:F=OPENUP(Dr$+Fn$):PTR#F=EX%:PR
INT#F,"*END*":PRINT#F,STR$(tm%):PRINT#F,
"*PRINT*":CLOSE#F:F=OPENIN(Dr$+Fn$):P%=0
:B%=0:PRINT:FORX%=0TOmx%:T%(X%)=0:NEXT
 1090 REPEAT:PROCrd:PRINT".";:N%=TRUE:IF
P%>0PROCs
 1100 IFN%P%=P%+1:A$(P%)=A$:W%=T%-U%:T%(
B%)=T%(B%)+W%:U%=T%:B%=P%
 1110 UNTILEOF#F:CLOSE#F:PROCdp:ENDPROC
 1120 DEFPROCrd:d$=D$:INPUT#F,D$:IF VAL(
D$)=0 INPUT#F,T$ ELSE T$=D$:D$=d$
 1130 IFD$="*END*"T%=VAL(T$):REPEATINPUT
#F,D$:UNTILEOF#F:D$=d$:A$="*PRINT*":Y$=""
:ENDPROC
 1140 INPUT#F,A$,Y$:T%=VAL(T$):ENDPROC
 1150 DEFPROCs:FORX%=1TOP%:IFA$=A$(X%)W%
=T%-U%:T%(B%)=T%(B%)+W%:U%=T%:B%=X%:N%=F
ALSE
 1160 NEXT:IFN%ANDP%=mx%PROCer("Too many
 applications: increase mx% (line 60)")
 1170 ENDPROC
 1180 DEFPROCdp:IFP%=0 PROCer("No log fo
und"):ENDPROCELSE PRINT
 1190 OU=OPENOUT(Dr$+Fn$+"L"):PRINT#OU,"
%OP%BM4":PRINT#OU,"%OP%LM4":PRINT#OU,"%0
P%HE/LOGGER %H4%(C) Ian Summers 1988%H4%
//Page "P"/"
 1200 PRINT#OU,"%OP%FO/"+Fn$+"L//"D"/":P
RINT#OU,"%CO:A,72,72%%C%%H2%Log of file:
 "+Fn$+"%H2%":PRINT#OU:tt%=0:FORX%=1TOP%
:IFLEFT$(A$(X%),1)="*"ORT%(X%)<60THENGOT
O1270
 1210 tt%=tt%+T%(X%):ld$="NEW":PRINT#OU,
"":PRINT:F=OPENIN(Dr$+Fn$):PROCrd:U%=T%
:AO$=A$:CO$=Y$:REPEAT:PROCrd
 1220 IFD$<>ld$ANDAO$=A$(X%)PRINT#OU,"
+ "+IP$+D$+IP$:PRINT'"S$D$S$:ld$=D$
 1230 IFU%MOD86400>0%V$="0"ELSEV$=" "
 1240 IFAO$=A$(X%)ANDT%-U%>59tm%=U%:OU$=
LEFT$(FNrt,5)+" "+AO$+STRING$(10-LENAO$,
" ")+FNHR(T%-U%)+V$+STRING$(3," ")+CO$:P
RINTOU$:PRINT#OU,OU$
 1250 AO$=A$:CO$=Y$:U%=T%:UNTILEOF#F:CLO
SE#F:OU$=STRING$(6," ")+A$(X%)+STRING$(1
0-LENA$(X%)," ")+FNHR(T%(X%))+STRING$(4,
" ")+"TOTAL (hrs:mins)"
 1260 PRINTB$OU$B$:PRINT#OU,PB$+OU$+PB$
 1270 NEXT:LL$="Total hours for "+Fn$+"
are "+FNHR(tt%)
 1280 PRINT'B$LL$B$':LL$=PB$+LL$+PB$:PRI
NT#OU,"":PRINT#OU,LL$:CLOSE#OU
 1290 PRINT"To print the log - go into a
 blank PipeDream application and enter:"
'TAB(10)B$a$CHR$43"FL"Dr$Fn$"L "a$CHR$22
5TAB(10)a$CHR$43"PO "B$a$CHR$225'
 1300 PRINT'"Print of "Fn$" finished - P
ress a key to continue":IFGET:ENDPROC
 1310 DEFPROCer(er$):CLS:PRINT Z$er$F$"
"Press a key to continue"F$;:IFGET:PRINT
TAB(0,2)SPC30TAB(0,1):ENDPROC
 1320 DEFPROCnr:PROCer("Device "+Dr$+" n
early full"+gp$+"Last action has not bee
n carried out"+gp$+"Create some room usi
ng FILER before continuing"):ENDPROC
 1330 :
 1340 DEF PROCE(B)
 1350 REM Cambridge Computer Ltd
 1360 IF B=0 THEN ENDPROC
 1370 A=OPENOUT":RAM.0/EE.CLI"
 1380 B$=":RAM.0/E.CLI"
 1390 PRINT#A,".>"+B$
 1400 PRINT#A,".J","LIST"+STR$(B),"PROCF"

 1410 CLOSE#A
 1420 *CLI .*:RAM.0/EE.CLI
 1430 ENDPROC
 1440 DEF PROCF
 1450 A=INKEY(0)
 1460 A=OPENIN B$
 1470 INPUT#A,A$,A$
 1480 CLOSE#A
 1490 A=OPENOUT B$
 1500 PRINT#A,".J",A$
 1510 PTR#A=PTR#A-1
 1520 BPUT#A,0
 1530 CLOSE#A
 1540 *ERASE :RAM.0/EE.CLI
 1550 VDU8
 1560 OSCLI"*CLI .<"+B$
 1570 ENDPROC
```

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PROGRAM Library No.24

Compiled by Steve Turnbull

Searching through back issues of the Library looking for a particular routine that you were sure was in the April 1987 issue can be a very time-consuming and tedious. So this month we're producing an index of all the programs we've ever published in the Library along with a brief description of what they are for. Now all you have to do to find that elusive utility is look it up.

Input

Name	Language	Description	Issue
Key input	Basic	Limited single key entry routine	March 1987
String input	Basic	Safe string entry routine to replace INPUT command	April 1987
Number input	Basic	Controlled input of numbers replacing INPUT command	May 1987
Form filler	Wordwise Plus	Easy entry of data into forms	June 1987
Clear input	Basic	String input length illuminated by blocks	January 1988
String tidy	6502	Standardises upper/lower case of input strings	August 1988
Binary print	Basic	Displays numbers in binary	September 1988
Protected input	Pascal	Controlled character input	October 1988

Output

Name	Language	Description	Issue
Hexout	6502	Prints hexadecimal numbers	March 1987
Print text	6502	String output	March 1987
Faint characters	6502	Makes on-screen text unreadable	June 1987
String output	6502	Prints string containing any Ascii code	July 1987
Formatting numbers	Basic	Allows numbers to be printed in specific format	July 1987
Print using	Basic	Returns string of number in specific format	September 1987
Delay print	Basic	Prints strings slowly with word wrap	September 1987
Feint text/Mode 7 zap	6502/Basic	Modifications to Faint text plus Mode 7 screen zoom in and zoom out.	September 1987
Striped writing	Basic	Text printed with striped coloured letters	October 1987
Double height	Basic	Prints double height characters in Modes 0 to 6	November 1987
Text scroller	Basic	Scrolls text across the screen	November 1987
Ascii to Integer	6502	Converts number string in various bases to integer	December 1987
Decimal to Roman	Basic	Faster conversion from decimal to Roman numerals	December 1987
Labels	Wordwise Plus	Prints address labels with special message added	December 1987
Fast ellipses	Basic	Draws ellipses without sines and cosines	January 1988
Trendy print	Basic	Reveals text smoothly from top to bottom	January 1988
Vertical labeller	6502	Rotates a text string through 90 degrees	February 1988
Disc jacket template	Basic	Prints a template to cut out and make disc jacket	April 1988
Double height	6502	Displays double height text using normal PRINT commands	May 1988
Elegant text printer	6502	Output any string embedded in machine code	May 1988
Smooth scroller	6502	Scrolls message on Mode 2 screen with pause and flash	June 1988
Barrel scroller	6502	Rolls characters on to screen from top to bottom	July 1988
Roller	6502	Rolls lines on to screen from top to bottom single or double height	September 1988
Super scroll	6502	Moves big characters across the screen along a mathematical path	January 1989

Conversions

Name	Language	Description	Issue
Number Bases	6502	Prints a 16 bit number in any base from 2 to 255	May 1987
Roman to decimal	Basic	Converts Roman numerals to decimal	July 1987
Decimal to Roman	Basic	Converts decimal numbers to Roman numerals	October 1987

Disc

Name	Language	Description	Issue
Disc title check	6502	Repeated disc checking until title matches string	May 1987
Disc Info	6502	Displays number of files and size of disc	June 1987
ADFS total compact	Basic	Ensures ADFS disc completely compacted	October 1987
Cat plus	6502	Improved file/size information about disc	October 1987
File peek	Basic	Decides file type from load and exec addresses	February 1988
Basic Saver	6502	Saves program using name in first line	April 1988
Password	6502	Creates !boot file to ask for password	April 1988
Date stamp	6502	Puts the date into the load and exec information	January 1988

Display

Name	Language	Description	Issue
Pattern fill	6502	Character-based screen clear	July 1987
Melter	6502	Screen clear in various patterns	October 1987

Miscellaneous

Name	Language	Description	Issue
Program-less Diary	Basic	Uses Basic line numbers as dates for a diary	May 1987
Break message	6502	Prints message after Break or Control+Break	October 1987
Sample Menu	Pascal	Protected input and menu system	October 1987
Tab-copy	6502	Uses key press to jump to alternate routine	November 1987
Day find	Basic	Gives day of week of date given	November 1987
Date stamp	Wordwise Plus (Master)	Includes current date when text printed	August 1987
Date stamping	Wordwise Plus (Master)	Inserts date into text when segment invoked	November 1987
Sideways ram clear	6502	Clears a sideways ram with zeroes	December 1987
Sound reducer	6502	Reduces volume of all sounds	December 1987
Address print	Basic	Prints address labels several across	January 1988
Wordwise startup	Wordwise Plus	Menu system for word processing	January 1988
Envelope find	Basic	Prints sound envelope definitions	February 1988
Break message	6502	Prints start-up message on Break or Control+Break	April 1988
Simple terminal	Basic	Routine that routes input and output to serial port	March 1988
Easter day	Basic	Calculates date of Easter for a given year	March 1988
Anagram	Basic	Outputs all permutations of input string	March 1988
Fax diary	Basic	Prints calendar for personal organisers	May 1988
Ascii from Inter-Word	6502	Converts Inter-Word format file to Ascii	June 1988
Permanent function keys	6502	Maintains function keys across Control+Break	June 1988
Elegant Anagrams	Basic	Produces all permutations of a given string	June 1988
Centre & Underline	Wordwise Plus	Easy text styles for word processing	July 1988
Where on Earth?	Basic	Calculates shortest distance between two points	July 1988
No language environment	6502	Complete language permitting just star commands	August 1988
Line printing	Basic	Short line editing routine with wysiwyg display	October 1988
Dancing cursor	6502	Interrupt driven routine to change cursor shape	November 1988

Programming

Name	Language	Description	Issue
Error recovery	6502	Handles errors in machine code	March 1987
Line number stripper	Wordwise Plus	Removes line numbers from Ascii version of Basic	March 1987
Relocator	Basic	Program relocation routine	April 1987
Cursor on/off	6502	Switches the cursor on and off in any mode	April 1987
Master Clock/Calendar	Basic IV or V	Splits result of TIME$ into date or time	April 1987
Instant line stripper	Wordwise Plus	Quick way of removing line numbers from Ascii Basic	June 1987
Joystick Test	Basic	Tests for presence of joystick	September 1987
Random numbers	6502	Generates random number from TIME	September 1987
Environment	Basic	Detects which machine and filing system in use	November 1987
Register loader	ARM	Puts big numbers in ARM registers	February 1988
VIA interrupts	6502	Easy to use package for intercepting interrupts	February 1988
Label highlighting	6502	Emphasises labels within machine code source	March 1988
Alpha sort	Basic	Bubble sorts an array of strings	March 1988
Teletext characters	Basic	Allows you to design teletext graphics	May 1988
String search	Basic	Routine to find a string regardless of case	May 1988
Label highlights 2	6502	Emphasises machine code labels in all modes except 7	July 1988
Functions	Lisp	Various list handling functions for Lisp	July 1988
Error correction	Basic	Automatic editing of line containing the error	August 1988
Number functions	Basic	Various number crunching routines	October 1988
Memory status display	6502	Displays information about current Basic program	November 1988
Shell sort	6502	Demonstrates this efficient sorting technique	November 1988
Read/write I/O processor	6502	Routines to communicate easily from second processor	November 1988
Word wrap	6502	Text output routine with automatic word wrap	November 1988
Menu system	Basic	Complete expandable method of handling menus	January 1989

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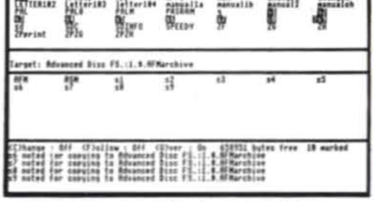

```
Advanced File Manager 1.04 (C) PRES 1988.
Target: Advanced Disc FS.:1.$.AFMarchive
```

Screen picture shows AFM in Copy mode on Master Turbo

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AFM has four distinct modes:

MENU – allows browsing through the files and directories on a disc. Files are started from a menu of up to 7 options chosen for a selected ROM. Loaders are provided for Basic, The Basic Editor, View, ViewSheet, ViewStore, ViewSpell, Edit, Wordwise (+) and InterWord. This list can be expanded infinitely using an Acorn-approved OSWORD call... full details and example in the manual..

DELETE – allows files to be marked and then deleted with one keystroke.

RENAME – allows one or more files to be marked and then renamed using a wildcarded name, ie one which varies with each file renamed. Thus you could rename s1, s2 and s3 to be s1_old, s2_old, and s3_old in one operation... and that's only the beginning! As well as using the whole of the original name you can also pick out individual characters to form part of the new name.

COPY – the strongest feature of AFM. It is a two stage copy routine. With both source and target directories shown on screen the files to be copied are marked. Once all the files have been marked copying is started and the computer can be left to get on with it!
Large files can be split across several disks, and recombined.

As much as possible of the computer's memory is used for copying files, including unused parts of shadow screen memory, sideways ram banks (inc. AP7), ram cartridges (inc. ABR (32K) and AQR (256K)), tube memory (up to 61K), B+ paged ram (12K) and unused parts of the Slogger Master Ramboard (Electron).
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Micro expansion

Games old and new are investigated by Hac Man

YOU may already know that Acorn recently halved the price of the Master 512 IBM compatible co-processor. For something that first appeared on the market at around £400 to retail now at a quarter of that price is an astounding bargain – and it has proved too much for me to resist.

What are my first impressions of IBM games? Not a lot. Many of them probably wouldn't even get on to the BBC Micro software shelves. Only one – a dungeons and dragons-type game by the name of Rogue – has really grabbed me. It's nothing at all to look at, but very addictive.

It has recently been re-released by Mastertronic. However, although the original game – available, I understand, through the public domain – worked almost perfectly on the Master 512, this new version does not – not even with the improved 2.1 version of Dos Plus. A great pity, since the new version features many enhancements.

I am trying to compile a list of software of all types – not just games – that run on the Master 512 and any information would be greatly appreciated.

> *Master misses out on the 512 Rogue*

Clogger clashes

I first mentioned the subject of games clashing with sideways roms a few months ago, and it is still a problem. Latest victim is **Clogger**, a version of which appeared on the free disc supplied with the December 1988 issue of *The Micro User*. The offender is Exmon II, the excellent machine code monitor without which most of my own pokes would not have seen the light of day.

In fact the game works perfectly with Exmon II 2.01 but not with the first version – 1.00. You can check which one you have by typing *HELP – the 1.00 rom is not compatible with the Master and crashes frequently, making an upgrade almost essential. It is also well worth upgrading if you own a B+ or a Model B with expanded memory, because you can specify new parameters when examining memory, allowing you to peek into shadow ram or filing system ram or private MOS ram.

However, if you have Exmon II 1.00 plugged into a standard Model B, version 2.01 offers little over its predecessor. Nevertheless, the sudden loss of Clogger might prompt quite a few readers who have experienced the delights of this most peaceful of games to consider a hasty upgrade. Here, however, is a cheaper option – simply enter the following line before running the game:

```
!&21E=!(!&FFB7+&1E)
```

The problem is that Exmon II 1.00 diverts the filing system control vector – FSCV – for its own purposes. This line just resets it by reading the default value from the OS rom. The rom call is legal and will work on all Acorn machines. Thanks to Walt Patterson for alerting me to this rather obscure but intriguing problem.

Ravenskull solution Part 2

Continuing from last month: Go back south to the roundabout and use the magenta/blue key to open the southern gate. Do not go south just yet because collecting the treasure there will cause a spiked gate to appear immediately to the east, blocking off a large section of the game.

Instead, clear all the treasure from the eastern and western passages. When you get to the southern end of the passages down the western side – just north of the Ravenbee – wait as before, then follow the Ravenbee and go north when you come to the *second* break in the wall.

Collect the treasure, move to the southwest corner of the castle and collect the scroll. Do NOT use it yet, but go back to the east avoiding the Ravenbee and duck north through the entrance surrounded by acid pools – the one you bypassed on the way in. Collect the treasure and return to the roundabout.

Stand in front of the eastern gate and open it with the scroll. Beware – this gate reappears as soon as you have gone through. Collect all the treasure and the pickaxe before going south: Make absolutely certain that you have got everything because two boulders slam together as you pass, blocking off your retreat.

Pick up the two pieces of treasure from the room with the two Ravenbees. Take great care –

Turn to Page 60 ▶

Featuring:

Way of the Exploding Fist
Clogger vs Exmon II
Master 512
Ravenskull
Labyrinth

◀ *From Page 59*

it's not easy. Walk around this room, not forgetting the treasure until, you come to the western side of the Ravenbee room. The coffins in the room to the south will do you no harm – they're just a bit unnerving.

Go north and take the first turning to the east. Do not go straight north, because the two spiked gates will move to block off both the eastern entrance and the way back. Pick up the scroll and drop it behind you. Do not use it – it's a trap and will kill you instantly.

Follow this path to its conclusion, then use the pickaxe to take out the section of wall immediately north of you. Go through and drop the pickaxe, then pick up the treasure and the second green/blue key.

Go through the spiked doors and collect the treasure in front of you. This will cause another spiked door to appear behind you, but don't worry – you've completed that section. Go south and pick up the last two pieces of treasure, then return to the roundabout.

Head north and duck into the first room you come to – just before the four with the slamming doors. Use the key to open the door, go through and pick up the first piece of the crucifix. You have now completed level 1 of Ravenskull.

If when attempting to pick up the crucifix you get the message *treasure?*, it means that somewhere along the way you have missed one or more of the pieces. Unfortunately, this almost certainly means that you will have to start the assault on Castle Ravenskull all over again.

“Cassette Fist – a real steal if you don't already have it”

Master of the Fist

Regular readers may remember the December 1988 column in which I featured a routine to convert the disc version of **Way of the Exploding Fist** to run on the BBC B+ and Master 128. Fist, in my humble but often-voiced opinion, was the best of the karate games that suddenly appeared on the BBC Micro a few years ago, so I was glad to see it re-issued recently on the Mastertronic Ricochet label. The cassette version now retails at a mere £1.99 – a real steal if you don't already have the game.

However, the cassette version has hitherto been denied to owners of B+ or Master. The problem is the same for both disc and cassette versions – the routine that generates the musical accompaniment features a direct call to a particular location in the Model B's OS 1.2 rom. As all the OS routines are located at different points in the different operating system roms, any game that uses this technique will not stand a chance of working on any other machine. In common with its predecessors, this latest release of Fist also proved to be incompatible with the Master.

The silly thing about the incompatibility of this latest version is that the game itself is now perfectly compatible – the music routine has been rewritten so that the direct MOS call now goes through the legal OS vectors. Only the loading routines didn't, but that's a different story.
mind. Both cassette and disc versions worked perfectly on the Master – only their protection routines didnt, but that's a different story.

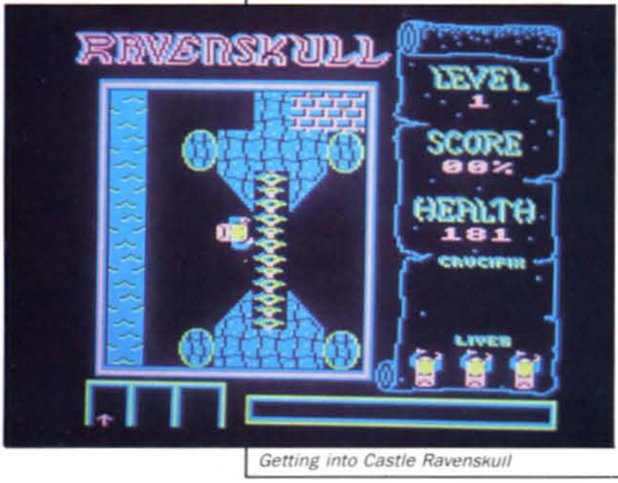
Nevertheless, we remain undaunted by all this illegal programming, and present a routine to convert the Ricochet tape version of Way of the Exploding Fist to run on the Master:

```
 10 REM Way of the Exploding Fist
 20 REM B+/Master conversion (Ricochet tape ve
rsion)
 30 REM by Hac-Man 1988
 40 REM (C) The Micro User
 50 REM
 60 !112=2819072
 70 !&2F00=&2FA00AA2:!&2F04=&4CFFF720
 80 !&2F08=&2E4C2D00:!&2F0C=&454D4147
 90 !&2F10=&30342031:!&2F14=&49480D30
100 CALL &2F00
```

Enter the listing as shown and save it on to one of your own blank tapes, calling it, say, FISTLDR. Insert the original Fist cassette, type RUN and press Return. The game will now load. The next time you want to play, LOAD "FISTLDR", insert the original Fist cassette, type RUN and press Return.

The only other point to note about the program is that you will save time if you wind the game cassette so that it is positioned just before the

Turn to Page 62 ▶



Getting into Castle Ravenskull

000000
18
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A fist in time

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MU2

◀ *From Page 60*

GAME1 file because the conversion routine does not make use of any files before this one.

One good thing can be said about incompatible games: As long as someone, somewhere, is not sticking to the rules, I will never be short of material with which to fill the odd corners of this column.

Amazing lives

I recently picked up a copy of the Master Compact version of the Acornsoft Hits Volume 2 – a collection of blasts from the dim and distant past, when Acornsoft was a games force in its own right and most of the best BBC Micro games came packed in those big, awkward black and blue cardboard boxes. Snapper, Hopper, Planetoid and other such arcade conversions were the best-sellers of the day – long before the advent of serious games such as Elite.

However, these older games should not be dismissed out of hand, they are still as playable as ever. After a hard day of running around mazes chomping power pills, Hac-Man finds a bit of simple relaxation is often better than any complex relaxation.

Labyrinth, featured on the above-mentioned compilation, is one of these oldies. I did not see the game until about a year after its initial release but I still go back to it from time to time when I fancy something to test both my arcade skills and my memory. Although it could never be described as mind-taxing, this plan view maze game does require a small degree of concentration to avoid getting hopelessly lost, and has a charm all its own. A fitting choice perhaps for some attention of a cheating nature with infinite lives:

```
 10 REM Labyrinth infinite lives
 20 REM Master Compact Acornsoft Hits 2 version
 30 REM by Hac-Man 1988
 40 REM (C) The Micro User
 50 FOR I%=0 TO 2 STEP 2
 60 P%=&900:[OPT I%
 70 JSR &1F0F:JSR &7100
 80 LDA #&AD:STA &4526 : \infinite lives
 90 JMP &1F00
100 ]:NEXT
110 PRINT "Please insert Acornsoft Hits disc
 and press a key...";:A%=GET
120 *MOUNT 1
130 ?&C413=&F2
140 *RUN !BOOT
150 !&21B5=&60AA00A9:CALL &900
```

As usual, save this routine on to one of your own blank discs, type RUN, press Return and follow the on-screen instructions.

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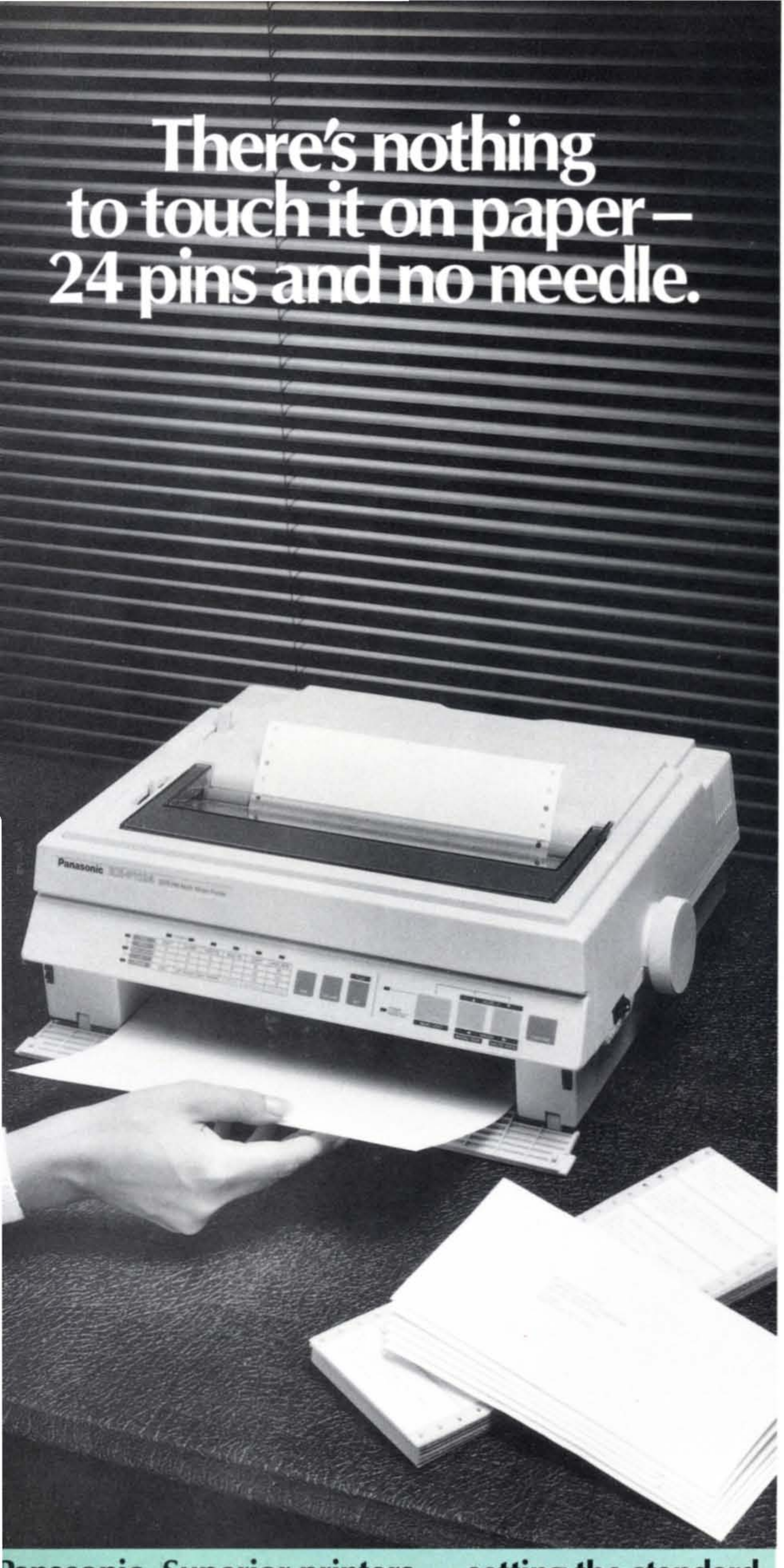

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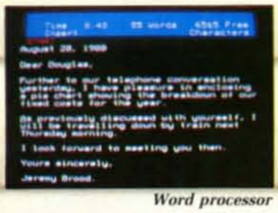

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MU2

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Divide and conquer

Ian Langdown offers you the ultimate solution to viewing those lengthy files

MOST people have used *TYPE to view a file, only to see the screen fill up with weird characters and the machine hang up. The program Split implements the equivalent of *TYPE but works on any type of file of any length, showing all the characters – including embedded codes – on an 80 column Mode 3 screen.

In addition, some files – especially those transmitted via telesoftware and electronic mail systems – are often too long to load into memory, so a way of shortening or splitting them is needed. But how do you know where to split it until you can view it – and how can you view it until you split it?

Apart from all this, there is the problem of how to perform the splitting. But again, Split comes to the rescue. Because it only loads one screenful at a time, it allows you to view files of any length. By positioning the cursor at the required place and pressing S you can split the text at exactly the place you want.

When Split is running the screen display shows Returns – Ascii value 13 – as wraparound arrows in the same way as does Inter-Word. Tab characters appear as arrows pointing to the right and line feed characters as arrows pointing down. All other non-printable characters are represented by large dots.

However, by positioning the cursor under any character its Ascii value can be read at the foot of the screen. The cursor keys work as usual and allow you to move around the screen at will.

You can examine your word processor files and see the embedded codes it uses, for example, corresponding to underline on or off. It is interesting to examine an Inter-Word file since every character at the beginning of a new line has had &80 added to the normal Ascii value thus revealing where all the soft returns are situated.

Split allows you to go back, but only by one screen. It is difficult to implement more than this because the size of each screenful of information varies according to how many Returns there are.

When run, Split requires a source filename, but an output filename is optional. Pressing the spacebar loads in the next one – provided, that is, you have specified an output file. Split is intelligent enough to know if you have just come back by one screen, and in this case does not save the current screen again.

Pressing L takes you back to the previous screen and S splits the file at the current cursor position. In this case the text up to – but not including – the character at the cursor is saved and the output file is closed. Split then prompts you for a new output filename and the remaining text on the screen is re-displayed so you can carry on. The splitting process can be carried out as many times as you need. Pressing the Escape key will close all files and quit Split.

Standard operating system routines have been used throughout, so Split will work on most BBC Micros. It can be assembled to page &1B00 if required for use on a network.

Type in the listing, ensuring you've made no mistakes using Get it Right!, and save it as SPL/SRC. Don't use the name Split as this is used for the resulting machine code file. Do not insert too many extra spaces as you enter the listing – for example don't type the space between the line number and the rest of the line, or put any redundant spaces at the end of a line – otherwise you may get a *No room* error. Finally set PAGE to &3000 and run the program with:

```
PAGE=&3000
CHAIN"SPL/SRC"
```

The machine code utility is automatically saved as Split ready to run with just *Split.

```
   10 REM File Splitter
   20 REM by Ian Langdown
   30 REM (c) The Micro User
   40 IFPAGE<>&3000 PRINT"PAGE SHOULD BE
 AT &3000":END
   50 C$=CHR$141+CHR$129+CHR$157+CHR$131
+STRING$(3," ")
   60 A$=STRING$(4," ")+"FILE SPLITTER"+
STRING$(9," ")+CHR$156+CHR$&D
   70 B$="(c) The Micro User "+STRING$(5
," ")+CHR$156+CHR$&D
   80 oswrch=&FFEE:osasci=&FFE3
   90 osbyte=&FFF4:osbget=&FFD7
  100 osbput=&FFD4:osfind=&FFCE
  110 osargs=&FFDA:oscli=&FFF7
  120 osrdch=&FFE0:N=&70:D%=&3000:G=&72
  130 WA=&74:a=&77:B%=18:XA=&78:C%=22
  140 U=&79:S=&7A:L=&7B:x=&7C:y=&7D
  150 D=&7E:H=&80:O=&82:JA=&84:n=&A00
  160 M=n+30:E=&86
  170 FOR L%=0TO3STEP3:P%=&1900
  180 [OPT L%:.IC LDA=22:JSR oswrch
  190 LDA=7:JSR oswrch:LDX=0
  200 .MB LDA pA,X:JSR oswrch:INX
  210 CPX=50:BNE MB:.JC LDA=0:STA N
  220 STA WA:STA x:STA y:STA J:STA J+1
  230 STA J+2:STA f:LDA=1:STA Z:STA G
  240 STA P:STA T:LDA =D%DIV256
  250 STA N+1:STA G+1:STA P+1:LDA =B%
  260 STA a:LDA =C%:STA XA:LDX=4
  270 LDA=12:JSR osbyte:LDX=1:LDY=0
  280 LDA=4:JSR osbyte:.KC LDX=2
  290 LDA =NA MOD256:STA H
  300 LDA =NA DIV256:STA H+1
  310 .bB JSR K:DEX:BNE bB:LDX=2
  320 LDA =OA MOD256:STA H
  330 LDA =OA DIV256:STA H+1:.cB JSR K
  340 DEX:BNE cB
  350 LDA=&D:JSR osasci:JSR osasci
  360 .ZA LDA =YB MOD256:STA H
  370 LDA =YB DIV256:STA H+1::JSR K
  380 JSR V:CPX=0:BNE NB:JMP KA
  390 :.NB CPX=1:BNE qA:LDA=&D:JMP ZA
  400 .qA LDA=&40:JSR W:CMP=0:BNE b
  410 LDY=0:LDA =o MOD256:STA H
  420 LDA =o DIV256:STA H+1:JSR K
  430 JMP ZA:.b STA S
  440 .B LDA =rA MOD256:STA H
  450 LDA =rA DIV256:STA H+1:JSR K
  460 JSR V:CPX=0:BNE bb:JMP KA
  470 .bb CPX=1:BNE sA:LDA S:BEQ b
  480 LDA=0:STA L:JMP zA
  490 .sA LDA=&40:JSR W:CMP=0:BEQ OB
  500 LDA =PA MOD256:STA H
  510 LDA =PA DIV256:STA H+1:JSR K
  520 JMP B:.OB LDA=&80:JSR W:STA L
  530 .zA LDA=22:JSR oswrch:LDA=3
  540 JSR oswrch:INC f:.DA LDA G:STA P
  550 LDA G+1:STA P+1:LDA=12
  560 JSR oswrch:LDA N+1:STA D+1:LDY=0
  570 STY U:LDA N:STA D:LDA=&FF:LDX=0
  580 STX WA:.tA LDX S:BNE dB:STX D+1
  590 STX G+1:JMP e1
  600 .dB LDA=1:JSR osfsc:CPX=&FF
  610 BEQ rB:LDY S:JSR osbget:LDY=0
  620 STA (D),Y::INC D:BNE d:INC D+1
  630 .d INC x:JMP uA
  640 .QB LDY=0:STY y:STY x:LDA D
  650 BNE e:DEC D+1:.e DEC D:.e1 LDA D
  660 STA G:LDA D+1:STA G+1:JMP EA
```

Turn to Page 67 ▶

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◀ From Page 65

```
670 .uA CMP=&D:BEQ c:LDA x:CMP=79
680 BEQ c:JMP tA:.c INC U:LDA=0
690 STA x:LDA U:CMP a:BCC tA:BEQ tA
700 JMP QB:.rB LDA=0:STA Z:STY y
710 LDA D:BNE ex:DEC D+1:.ex DEC D
720 LDA D:STA G:LDA D+1:STA G+1
730 .EA JSR FA:LDA=12:JSR oswrch
740 JSR lA:LDA=1:STA JA:JSR QA:JSR z
750 LDA f:CMP T:BCC ZB:LDA Z:BNE ZB
760 LDA =vA MOD256:STA H
770 LDA =vA DIV256:STA H+1:JSR K
780 JSR RA:.ZB JSR p:LDA=0:STA x
790 STA y:TAX:TAY:JSR FA
800 .fA STX x:STY y:LDA M,Y:CMP=&FF
810 BNE zB:CPY=0:BEQ zB:DEY:LDX M,Y
820 STX x:STY y:.zB JSR z0:JSR wA
830 PHA:LDA=31:JSR oswrch:LDA=0
840 JSR oswrch:LDA=22:JSR oswrch:PLA
850 JSR xA:JSR eB:JSR RB:JSR z0
860 .AA JSR RA:CMP=&1B:BEQ mA:CMP=32
870 BNE SB:LDA f:CMP T:BNE gA:JSR SA
880 LDA Z:BNE gA:JMP KA:.gA JMP no
890 .SB AND=&DF:CMP =ASC"S":BNE z3
900 LDA L:BNE nA:JSR z
910 LDA =TA MOD256:STA H
920 LDA =TA DIV256:STA H+1:JSR K
930 JSR RA:JSR z:LDA=12:JSR oswrch
940 JSR p:JSR FA:JMP AA:.nA JMP aA
950 .z3 CMP =ASC"L":BNE yA:JSR bA
960 CMP=&1B:BNE z1:JSR z:JSR p
970 JSR FA:JMP AA:.z1 DEC f:JMP DA
980 .yA CMP#136:BCC AA:CMP#140
990 BCS AA:JMP i:.mA LDA=&7E
1000 JSR osbyte:JMP KA:.i CMP#136
1010 BNE j:JSR fB:JMP fA:.j CMP#137
1020 :BNE k:JSR TB:JMP fA:.k CMP#138
1030 BNE l:JSR gB:JMP fA:.l CMP#139
1040 BNE p:JSR up:JMP fA
1050 .p LDA #hA MOD256:STA H
1060 LDA #hA DIV 256:STA H+1
1070 .K LDY#&FF:.hB INY:LDA (H),Y
1080 CMP#&FF:BEQ iB:JSR osasci:JMP hB
1090 .iB RTS
1100 .RA LDA#21:LDX=0:JSR osbyte
1110 JSR osrdch:CMP#&1B:BNE ke
1120 LDA#&7E:JSR osbyte:LDA#&1B
1130 .ke RTS
1140 .V LDX#0:.go JSR osrdch:CMP#&1B
1150 BNE AB:LDA#&7E:JSR osbyte:LDA#&D
1160 STA n:LDX#0:RTS
1170 .AB CMP#127:BNE BB:JSR osasci
1180 TXA:BEQ go:DEX:JMP go
1190 .BB STA n,X:JSR osasci:INX
1200 CMP#&D:BNE go:RTS
1210 .W LDX =n MOD256:LDY =n DIV 256
1220 JSR osfind:RTS
1230 .lA LDA=31:JSR oswrch:LDA=0
1240 STA x:STA y:JSR oswrch
1250 JSR oswrch::LDA WA:BNE CB:LDA S
1260 BNE CB:STA D+1:STA G+1:LDA#226:JSR
oswrch:RTS
1270 .CB LDA N:STA D:LDA N+1:STA D+1
1280 .sB LDY y:STY U:RTS
1290 .jB JSR z:LDA=12:JSR oswrch
1300 JSR p:.FA LDA=28:JSR oswrch
1310 LDA=0:JSR oswrch:LDA=23
1320 JSR oswrch::LDA=79:JSR oswrch
```

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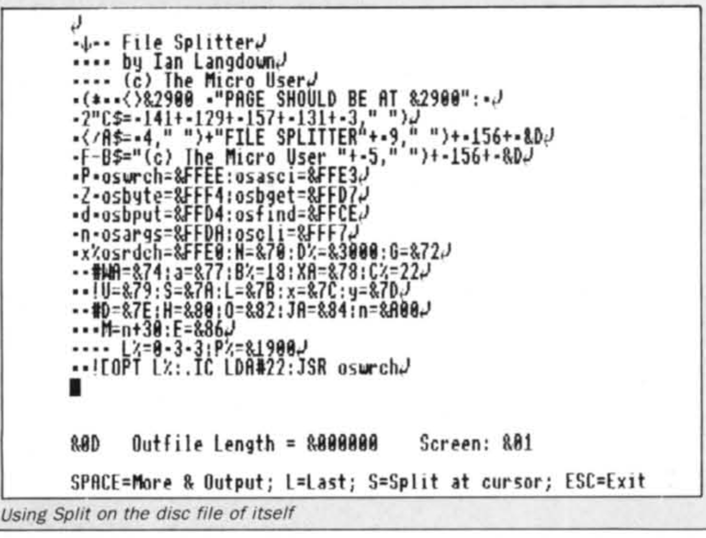
In addition to these many BBC Micro programs in the MicroLink library will also run on the Electron.

```
1330 LDA=0:JSR oswrch:.z0 LDA=31
1340 JSR oswrch:LDA x:JSR oswrch
1350 LDA y:JSR oswrch:RTS
1360 .z LDA=28:JSR oswrch:LDA#0
1370 JSR oswrch:LDA#24:JSR oswrch
1380 LDA#79:JSR oswrch:LDA#24
1390 JSR oswrch:RTS
1400 .SA LDA L:BNE ou:RTS:.ou LDA G+1
1410 BNE tB:RTS
1420 .tB LDA N+1:STA D+1:LDA N:STA D
1430 .q LDA D+1:CMP G+1:BCC iA
1440 LDA D:CMP G:BNE iA:LDY#0
1450 LDA (D),Y:LDY L:JSR osbput:RTS
1460 .iA LDY#0:LDA (D),Y:LDY L
1470 JSR osbput:INC J+2:BNE jA
1480 INC J+1:BNE jA:INC J:.jA INC D
1490 BNE r:INC D+1:.r JMP q
1500 .eB LDA #GA MOD256:STA H
1510 LDA #GA DIV256:STA H+1:JSR K
1520 LDA J:JSR cA:LDA J+1:JSR cA
1530 LDA J+2:JSR cA:RTS
1540 .RB LDA#DB MOD256:STA H
1550 LDA#DB DIV256:STA H+1:JSR K
1560 LDA f:JSR xA:RTS
1570 .DB OPT FNs(CHR$31+CHR$34+CHR$22+"
Screen: "+CHR$&FF)
1580 .f OPT FNb(0):.T OPT FNb(0)
1590 .no LDA#0:STA x:STA y:JSR jB
1600 INC f:LDA f
1610 CMP T:BCC uB:STA T:.uB JMP DA
1620 .KA LDY=0:LDA=0:JSR osfind:LDA=4
1630 LDX=0:JSR osbyte:LDA=22
1640 JSR oswrch::LDA=7:JSR oswrch
1650 LDX =qt MOD256:LDY =qt DIV256
1660 JMP oscli
1670 .qt OPT FNs("B."+CHR$&D)
1680 .fB LDA G+1:BNE vB:RTS
1690 .vB LDA=&86:JSR osbyte:CPX=0
1700 BEQ s:DEX:RTS
1710 .s CPY=0:BEQ t:DEY:LDX M,Y
1720 .t RTS:.TB LDA G+1:BNE kB:RTS
1730 .kB LDA=&86:JSR osbyte:.ri TXA
1740 CMP M,Y:BCS u:INX:RTS:.u LDX M,Y
1750 CPY U:BEQ t:INY:LDX#0:RTS
1760 .gB LDA G+1:BNE wB:RTS
1770 .wB LDA=&86:JSR osbyte:CPY U
1780 BNE v:JMP AA:.v INY:TXA:CMP M,Y
1790 BCC t:.w LDX M,Y:RTS
1800 .up LDA G+1:BNE xB:RTS
1810 .xB LDA#&86:JSR osbyte:CPY=0
1820 BEQ t::DEY:TXA:CMP M,Y:BCS w
1830 RTS
1840 .pA OPT FNs(STRING$(50,CHR$0))
1850 .YB OPT FNs(CHR$&D+CHR$134+"Source
 filename: "+CHR$&FF)
1860 .o OPT FNs(CHR$&D+"File does not e
xist"+CHR$&D+CHR$&FF)
1870 .rA OPT FNs(CHR$134+"Output filena
me or RETURN: "+CHR$&FF)
1880 .PA OPT FNs(CHR$131+"FILE ALREADY
EXISTS"+CHR$&D+CHR$7+CHR$&FF)
1890 .GA OPT FNs(CHR$31+CHR$6+CHR$22+"O
utfile Length = &"+CHR$&FF)
1900 .J OPT FNb(0):OPT FNb(0):OPT FNb(0
)
1910 .bA OPT FNs(CHR$12+"SPACE=More & O
utput; L=Last; S=Split at cursor; ESC=Ex
it"+CHR$&FF)
1920 .Z OPT FNb(0):.vA OPT FNs(CHR$12+"
END OF FILE...Press a key"+CHR$7+CHR$&FF
)
1930 .TA OPT FNs(CHR$12+"No Output File
 Exists.  Press a key"+CHR$7+CHR$&FF)
1940 .xA PHA:LDX x:LDY y:INY:LDA M,Y
1950 DEY:CMP#&FF:BNE z4:TXA:CMP M,Y
1960 BCC z4:PLA:LDA=32:JSR oswrch
1970 JSR oswrch:JSR oswrch:RTS
1980 .z4 LDA=38:JSR oswrch:PLA
1990 .cA PHA:LSR A:LSR A:LSR A:LSR A
2000 JSR ph:PLA:.ph CLC:AND=&F
2010 ADC=&30:CMP=&3A:BCC yB:ADC=6
2020 .yB JMP oswrch:.dA LDA N+1
2030 STA D+1:LDA N:CLC:ADC x:STA D
2040 BCC EB:INC D+1:.EB CPY=0:BEQ z2
2050 DEY:LDA M,Y:CLC:ADC=1:ADC D
2060 STA D:BCC EB:INC D+1:JMP EB
2070 .z2 LDA (D),Y:RTS
2080 .wA LDA=&86:JSR osbyte:STX x
2090 STY y:JSR dA:RTS
2100 .QA LDA G+1:BNE UB:STA x:STA y
2110 STA O:LDA=12:JSR oswrch:LDX=&FE
2120 JMP kA:.UB LDY y:STY O:LDX x
2130 LDA=&FF:STA M,Y:.Sc LDA D+1
2140 CMP G+1:BCC Ge:BEQ lB:BCS kA
2150 .lB LDA D:CMP G:BCC Ge:BEQ Ge
2160 .kA LDA=226:JSR oswrch:LDY O:DEX
2170 CPX=&FF:BEQ BA:CPX=79:BCC BA
2180 LDA =79:STA M,Y:INY:STY O:LDA=0
2190 STA M,Y:JMP mB:.BA INX:.mB TXA
2200 STA M,Y:INY:LDA=&FF:STA M,Y
2210 LDA=&86:JSR osbyte:LDA=32
2220 .AC JSR oswrch:INX:CPX=80:BCC AC
2230 LDX=0:.BC JSR oswrch:INX:CPX=80
2240 BCC BC:STY U:RTS
2250 .Ge LDY=0:LDA (D),Y:CMP=32
```

Turn to Page 68 ▶



```
↲
·↓·· File Splitter↲
···· by Ian Langdown↲
···· (c) The Micro User↲
·(*··<>&2900 ·"PAGE SHOULD BE AT &2900":·↲
·2"C$=·141+·129+·157+·131+·3," ")↲
·</A$=·4," ")+"FILE SPLITTER"+·9," ")+·156+·&D↲
·F-B$="(c) The Micro User "+·5," ")+·156+·&D↲
·P·oswrch=&FFEE:osasci=&FFE3↲
·Z·osbyte=&FFF4:osbget=&FFD7↲
·d·osbput=&FFD4:osfind=&FFCE↲
·n·osargs=&FFDA:oscli=&FFF7↲
·x%osrdch=&FFE0:N=&70:D%=&3000:G=&72↲
··#WA=&74:a=&77:B%=18:XA=&78:C%=22↲
··!U=&79:S=&7A:L=&7B:x=&7C:y=&7D↲
··#D=&7E:H=&80:O=&82:JA=&84:n=&A00↲
···M=n+30:E=&86↲
···· L%=0·3·3:P%=&1900↲
··![OPT L%:.IC LDA#22:JSR oswrch↲
█


&0D   Outfile Length = &000000    Screen: &01

SPACE=More & Output; L=Last; S=Split at cursor; ESC=Exit
```

Using Split on the disc file of itself

◄ From Page 67

```
 2260 BCC nB:CMP=127:BCS UA
 2270 .MC JSR osasci
 2280 .F INX:CPX=80:BCC aB:DEX:TXA
 2290 LDY O:STA M,Y:LDX=0:INC O
 2300 .aB INC D:BNE Sc:INC D+1:JMP Sc
 2310 .nB CMP=&D:BNE FB:LDA=224
 2320 JSR oswrch:.CC CPX=0:BNE Cσ
 2330 STA JA:.Co TXA:LDY O:STA M,Y
 2340 CPX=79:BCC DC:JMP EC:.DC LDA=32
 2350 .Pd INX:JSR oswrch:CPX=79:BCC Pd
 2360 .EC LDA JA:BNE FC:RTS
 2370 .FC LDX=0:INC O:LDY O:LDA=&FF
 2380 STA M,Y:JMP aB:.FB CMP=9:BNE UA
 2390 LDA=225:JSR oswrch:JMP F
 2400 .UA CMP=10:BNE oA:LDA=228
 2410 JSR oswrch:JMP F
 2420 .oA LDA=227:JSR oswrch:JMP F
 2430 .aA LDA=&86:JSR osbyte:STX x
 2440 STY y:JSR z:CPX=0:BNE GB:CPY=0
 2450 BNE GB:.GC LDY L:LDA=0
 2460 JSR osfind:JMP HA
 2470 .GB LDA G+1:BEQ GC:STA O+1
 2480 LDA G:STA O:LDA D:STA G:LDA D+1
 2490 STA G+1:LDA G:BNE HB:DEC G+1
 2500 .HB DEC G:JSR SA:LDA=0
 2510 JSR osfind:INC G:BNE IB:INC G+1
 2520 .IB LDA G:STA D:LDA G+1:STA D+1
 2530 LDA O:STA G:LDA O+1:STA G+1
 2540 .HA LDA =JB MOD256:STA H
 2550 LDA =JB DIV256:STA H+1
 2560 .IA JSR K:JSR V:CPX=0:BEQ IA
 2570 CPX=1:BEQ IA:LDA=&40:JSR W:CMP=0
 2580 BEQ VB:TAY:LDA=0:JSR osfind
 2590 LDA =g MOD256:STA H
 2600 LDA =g DIV256:STA H+1:JSR K
 2610 JSR RA:JMP HA
 2620 .VB LDA=&80:JSR W:STA L
 2630 LDA N:STA H:LDA N+1:STA H+1
 2640 JSR FA:JSR z0
 2650 .KB LDY=0:LDA D+1:CMP G+1:BCC oB
 2660 LDA D:CMP G:BEQ WB
 2670 .oB LDA(D),Y:STA (H),Y:INC D
 2680 BNE HC:INC D+1:.HC INC H:BNE pB
 2690 INC H+1:.pB JMP KB
 2700 .WB LDA (D),Y:STA (H),Y:LDA H
 2710 STA G:LDA H+1:STA G+1:LDA N
 2720 STA D:LDA N+1:STA D+1:LDA=0
 2730 STA J:STA J+1:STA J+2:JMP EA
 2740 .JB OPT FNs(CHR$12+"New Filename :
 "+CHR$&FF)
 2750 .g OPT FNs(CHR$7+"File Exists: Pre
ss a key"+CHR$&FF)
 2760 .NA OPT FNs(C$):OPT FNs(A$)
 2770 OPT FNb(&FF)
 2780 .OA OPT FNs(C$):OPT FNs(B$)
 2790 OPT FNb(&FF)
 2800 .bA LDX =E:LDY S:.LC LDA T:CMP=1
 2810 BEQ XB:CMP f:BEQ qB:.XB JSR z
 2820 LDA =VA MOD256:STA H
 2830 LDA =VA DIV256:STA H+1:JSR K
 2840 JSR RA:JSR FA:LDA=&1B:RTS
 2850 .qB LDA=0:JSR osargs:LDA G:CLC
 2860 ADC=1:STA D:LDA G+1:ADC=0
 2870 STA D+1:LDA D:SEC:SBC N:STA D
 2880 LDA D+1:SBC N+1:STA D+1:LDA E+1
 2890 CMP D+1:BCC CA:LDA E:SEC:SBC D
 2900 STA E:LDA E+1:SBC D+1:STA E+1
 2910 LDA=1:JSR osargs:LDA P:CLC:ADC=1
 2920 STA D:LDA P+1:ADC=0:STA D+1
 2930 LDA D:SEC:SBC N:STA D:LDA D+1
 2940 SBC N+1:STA D+1:LDA E+3:BNE LA
 2950 LDA E+2:BNE LA:LDA E+1:CMP D+1
 2960 BCC CA:BNE LA:LDA E:CMP D:BCC CA
 2970 .LA LDA E:SEC:SBC D:STA E
 2980 LDA E+1:SBC D+1:STA E+1
 2990 .LB LDA=1:JSR osargs:RTS
 3000 .CA LDA=0:STA E:STA E+1:STA E+2
 3010 STA E+3:JMP LB
 3020 .P OPT FNb(0):OPT FNb(0)
 3030 .VA OPT FNs(CHR$12+"1st page -OR-
already back 1 page   Press a key"+CHR$7
+CHR$&FF)
 3040 .osfsc JMP(&21E)
 3050 ]:NEXT
 3060 FORI%=0TO49:READA%:I%?pA=A%:NEXT
 3070 DATA 23,224,3,3,3,35,70,252,64
 3080 DATA 32,23,225,48,24,12,126,126
 3090 DATA 12,24,48,23,226,255,255,255
 3100 DATA 255,255,255,255,255,23,227
 3110 DATA 0,0,0,60,60,0,0,0,23,228,0
 3120 DATA 24,24,24,153,219,60,24
 3130 $&700="*SAVE Split 1900 "+STR$~P%
 3140 X%=0:Y%=7:CALL&FFF7:END
 3150 DEFFNb(B%):?P%=B%:P%=P%+1:=L%
 3160 DEFFNs(s$):$P%=s$:P%=P%+LENs$:=L%
```

Get it right!

```
  10 =    0 0
  20 =    0 0
  30 =    0 0
  40 = 4B75 5
  50 = DAE7 E
  60 = CE88 9
  70 = 6946 B
  80 = 8F1A 5
  90 = D738 7
  00 = DA58 4
  10 = 9F38 F
  20 =  E70 6
  30 = 829F 9
  40 = 5E4F 5
  50 = ECC8 F
  60 = 7A1F 2
  70 = 43CC A
 180 = C5ED D
 190 = 784C 1
 200 = AE1B 2
 210 = 5143 B
 220 = 6B5A C
 230 = A878 7
 240 = E844 D
 250 = C8AC A
 260 = 5128 4
 270 = A4AD C
 280 = 5C7A B
 290 = 5B46 3
 300 =   C3 8
 310 = FE02 C
 320 = 1E25 6
 330 = DE46 F
 340 = D537 3
 350 = CF20 2
 360 = C3FE 5
 370 = C70F 4
 380 = 4227 3
 390 = 77D1 0
 400 = 9D68 6
 410 = A6F9 9
 420 =  4F9 A
 430 = 301E 8
 440 = C667 8
 450 = 2999 3
 460 = 2BA3 D
 470 = 37E6 8
 480 = B233 A
 490 = EE6C D
 500 = C9C3 1
 510 = 9FEF 7
 520 =  C3D B
 530 = 67A9 7
 540 = 3F10 4
 550 = E0AB 3
 560 = B3D2 F
 570 = 5146 D
 580 = C38F 6
 590 = E9DB E
 600 = 13B3 6
 610 = 1E7F B
 620 = 4D3C 2
 630 = 383D E
 640 = 54D2 9

 650 = 7755 A
 660 = 591A 5
 670 = 27A8 3
 680 = EE9D 8
 690 = FDB4 E
 700 = 4FD8 9
 710 = 2080 D
 720 = FBDA 2
 730 = 26D4 C
 740 = 3545 5
 750 = 47FC 4
 760 = 6BC0 8
 770 = 4E22 9
 780 = 6346 0
 790 = DD7D A
 800 = B764 E
 810 =  26D C
 820 = 43E7 A
 830 = F944 A
 840 = 32CC 6
 850 = AC93 6
 860 = D6C1 D
 870 = 99FB E
 880 = 32EC 8
 890 = D5FB 7
 900 = AB7F 4
 910 = CC6E 5
 920 = F854 4
 930 = 6F6B 8
 940 =   4F B
 950 = CFF0 9
 960 = 5B13 5
 970 = 8D50 1
 980 = 817E B
 990 =  D0A 9
1000 = AD57 5
1010 = 81C5 0
1020 = 78EC 7
1030 = D615 2
1040 = 19DA 5
1050 = 87DC 7
1060 = AA6A F
1070 = 2438 B
1080 = 9BDE 9
1090 = B162 6
1100 = D4F2 6
1110 = 6380 6
1120 = 9D22 B
1130 = 5542 9
1140 = E75A B
1150 = E64A 7
1160 = 239E 9
1170 = AC96 5
1180 = 62C9 7
1190 = F7D9 C
1200 = 60A0 A
1210 = AED2 8
1220 = 6EAB 0
1230 = 37D8 F
1240 = 7BCC D
1250 = DC00 5
1260 = 4637 6

1270 = 30C0 D
1280 = D8D6 E
1290 = F060 7
1300 = 76C3 F
1310 =  102 D
1320 = 9A61 1
1330 = 2B06 6
1340 = ACE8 0
1350 = 2CBA 9
1360 = 9AA7 E
1370 = 32BA 3
1380 = 98A1 0
1390 = ADF0 5
1400 = 4919 1
1410 = 9A71 F
1420 = 22D3 B
1430 = 69C3 C
1440 = 4E39 F
1450 = 9EB6 7
1460 =  3EB A
1470 = F078 B
1480 = 1F77 9
1490 = AEAA 6
1500 = 4FB1 1
1510 = 18A2 4
1520 = 5004 B
1530 = 1E6E E
1540 = A842 6
1550 = 25BC A
1560 = 56BC 2
1570 = D5DC 5
1580 = B297 8
1590 = 1370 E
1600 = D98D 5
1610 = EDA0 F
1620 = 25E3 0
1630 = 16E8 E
1640 = 38C0 4
1650 = 6ACC 5
1660 = 1B15 F
1670 = EA0E A
1680 = 48D6 0
1690 = 970F 6
1700 = 5C41 D
1710 = 5CB2 B
1720 = 75F0 D
1730 = 39B5 B
1740 = AD6D F
1750 = 123B 7
1760 = D880 F
1770 = DC09 8
1780 = FF3B 4
1790 = 94D0 5
1800 = FE10 8
1810 = 745B 0
1820 =  3F4 8
1830 = 9843 8
1840 = 672B 8
1850 = B659 3
1860 = 4DF5 5
1870 = D014 E
1880 = 61D8 1

1890 = 7E7E A
1900 = 3AAF 4
1910 = 516A A
1920 = A98C D
1930 = ECEF 0
1940 = 8517 1
1950 = 8028 C
1960 = BE03 6
1970 = 23D9 B
1980 = 8937 F
1990 = 6D6F 5
2000 = B602 3
2010 = ED0F 0
2020 = A7BD 5
2030 = F8CE D
2040 = 8B7C 4
2050 = AD54 0
2060 = 98A6 D
2070 = 2E0E 1
2080 = 34DF 1
2090 = 5A6E E
2100 = 98C4 7
2110 = 82C3 D
2120 = 21FD 8
2130 = C08B D
2140 = FE75 B
2150 = B88A F
2160 = B284 9
2170 = F542 E
2180 = 5CE0 6
2190 = E78A 6
2200 =  DA8 0
2210 = 3C67 6
2220 = 421F 0
2230 = 6CDB 9
2240 = AB9B E
2250 = F914 A
2260 = 5AA1 C
2270 = 9729 8
2280 = 37F1 4
2290 = D81C 3
2300 = 2FC9 4
2310 = 5B78 E
2320 = F5A0 8
2330 = 1E8F 2
2340 = 4829 A
2350 = 2E20 3
2360 = C3B1 D
2370 = C9E8 7
2380 = 23CB A
2390 = 4FAB 9
2400 = 302C 6
2410 = 1D2E E
2420 = D010 8
2430 =  DCA 9
2440 = 9FFA C
2450 = 18E6 D
2460 = 3B94 8
2470 = 9BD5 8
2480 = 87C0 4
2490 = 1225 7
2500 = 9A3D 2
2510 = D2C5 5
2520 = 6DF1 9

2530 = 9688 F
2540 = 2FEF D
2550 = 16D2 D
2560 = A07F 8
2570 = 32DA C
2580 = B60B 0
2590 = C307 1
2600 = B940 A
2610 = 9E68 8
2620 = 1F6B 4
2630 = F245 C
2640 = 7AA2 3
2650 = 4136 6
2660 = D0E0 D
2670 = 2BCE D
2680 = F601 B
2690 = 3ABB A
2700 = 6ED3 8
2710 = 21A0 2
2720 =  BBF 8
2730 = D7E8 9
2740 =  1AB 5
2750 = 9814 D
2760 = 7525 D
2770 = B539 E
2780 = 1B76 8
2790 = B539 5
2800 = 966F 5
2810 = FFB3 C
2820 = 46A8 F
2830 = 4399 5
2840 = 9D0D 3
2850 = 7B13 1
2860 = DFE3 1
2870 = FE03 F
2880 = EAA5 6
2890 = 116F 3
2900 = 994E A
2910 = B781 9
2920 = CB8C 1
2930 = 93F4 3
2940 =  A2B C
2950 = 1490 4
2960 = 5C96 B
2970 = C31E 8
2980 = 1E86 7
2990 = 1760 A
3000 = B5C6 3
3010 = 65F0 5
3020 = 14BC C
3030 = 6BEB E
3040 = 271A F
3050 = DA42 D
3060 = 67F3 F
3070 = 4508 8
3080 = 9DD1 9
3090 = FCCD E
3100 = 4D7F 3
3110 = D5EC 3
3120 = 2322 E
3130 = 1B2F A
3140 = 1EC4 C
3150 =  D4A 8
3160 = 1F5E A
```

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FAX △ PACK

With the ever increasing popularity of FAX machines this form of document communication is set to replace conventional postal deliveries with a fast, reliable, strike free, electronic mail service.

FAX PACK brings this world of facsimile document transfer to the Archimedes. By combining the facilities of a FAX machine with the power and flexibility of a computer, FAX PACK offers considerable benefits over conventional FAX systems.

FAX PACK basically allows any document, be it printed text or graphics, or an electronic document such as a word processor file, to be sent to FAX machines anywhere in the world, in seconds. This is done by scanning (digitising) the document and then sending it digitally over a normal phone line to the receiving FAX machine which re-constructs the image and then prints it.

THE HARDWARE

The basic FAX PACK consists of a modem podule that plugs into any Archimedes computer, and the software to drive it. A variety of options are available such as scanners and power switching boxes.

The podule has connections for a scanner and power switching box (see below) and a conventional telephone line. An adapter is provided allowing a conventional phone to be paralleled with FAX PACK so that only one telephone line is required for both FAX and conventional use. However if a lot of FAX mail is going to be sent/received then a separate dedicated line is advisable.

FAX-PACK
sample page
FAX-PACK
FAX-PACK
FAX-PACK
FAX-PACK
FAX-PACK
FAX-PACK
Computer Concepts Ltd

Scanner & Sheet Feeder

Unlike many normal FAX machines the hardware also provides both auto-answer and auto-dial facilities making it convenient and allowing completely automatic operation without human intervention.

THE SOFTWARE

As part of FAX PACK this not only provides all the basic mechanisms for communicating with FAX machines but also includes high level WIMP based facilities for viewing FAXes on screen within a window, where they can be pixel edited, scaled, cropped,printed, etc.

This WIMP based software is simplicity itself to use so FAX PACK can be used in the office by staff with little or no computer experience. Of course unlike any conventional FAX machine FAXes can be viewed on screen, or filed away on disc for future reference without ever getting onto paper.

The software also allows text, word processed files, even graphics, to be automatically converted to a suitable FAX format for sending to other FAX machines. The paperless office becomes closer to reality since it is now possible to write articles, documents or letters and then send these directly to remote machines without involving paper.

However facilities are also included for printing FAXes to a range of 9 and 24 pin dot matrix, inkjet and laser printers.

SUPER FAST MODEM

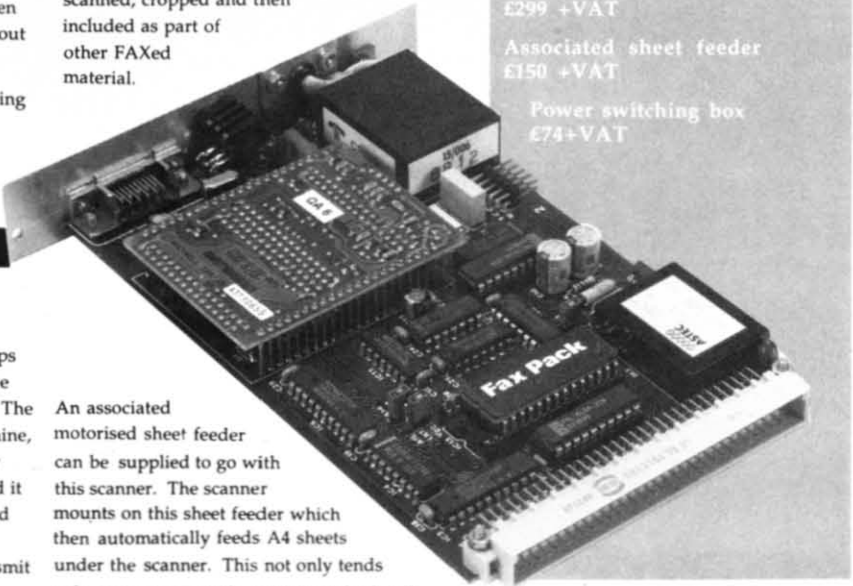
The FAX podule actually consists of a 9600 bps auto-answer, auto-dial modem, and so can be used for much more than just FAX transfer. The software can detect the type of remote machine, and if it finds a similarly equipped computer (rather than a FAX machine) at the other end it can then transfer ANY file fully error checked and glitch free. And by using some very advanced transmission protocols it can transmit data 4 times faster than most conventional modems on normal telephone lines.

THE SCANNER

In order to send printed material it is necessary to digitise the page. An optional hand-held, A4 width, 200 dpi scanner can connect to the FAX podule. Being hand-held it is not only supremely compact, but it can digitise complete A4 pages, or pages from books or other awkward shaped documents.

FAX-PACK
FAX-PACK

Of course images scanned in this fashion are not only useful for FAX purposes but also for inclusion in word processor or desk top publishing programs. FAX PACK software allows company logos and signatures to be scanned, cropped and then included as part of other FAXed material.



An associated motorised sheet feeder can be supplied to go with this scanner. The scanner mounts on this sheet feeder which then automatically feeds A4 sheets under the scanner. This not only tends to be more accurate than scanning by hand, but is also more convenient.

AUTOMATIC POWER SWITCH

This external power switching box can automatically switch the computer on in order to answer incoming FAXes. The FAX podule can then answer the phone, receive the FAX and file it to disc, and then switch the computer off again. The computer can therefore be switched off and left completely unattended for very long periods of time.

GUARANTEE

Not only do we provide a one year guarantee for the product, but also a 28 day money back no quibble guarantee. Owners can also receive free software updates as enhanced or new facilities are made available.

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Computer Concepts Ltd

Gaddesden Place,
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Telephone: 0442 63933 Fax: 0442 231632

The above prices include post and packing. Contact Computer Concepts or your local dealer for prices and availability.

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BUSH RESCUE

TELE-BOOK

4 Mation

The truth about TELEX

How much does it cost to go on Telex?

You could go the conventional way and buy a dedicated Telex machine. The cheapest will cost you £1,604 (the Whisper), the dearest £2,892 (the Cheetah). You will also need a separate telephone line, costing £101 to install, plus £404 a year rental. That's a total outlay over the first year of a minimum of £2,109. (All prices include VAT.)

Or you could do what more and more BBC Micro users are doing – use your BBC Micro to double as a Telex machine. And just use your ordinary telephone!

How do I turn my BBC Micro into a Telex machine?

All you need is a modem and appropriate communications software (see the advertisements in this issue), a telephone, and a subscription to *MicroLink*.

Telex is just one of a growing number of services available to micro users on *MicroLink*. You can also read the news as it happens, go teleshopping, create your own closed user group, send telemessages and electronic mail right round the world, download free programs directly into your micro . . . and much more.

But why use Telex?

Because it's a standard means of instant communication between businesses. Today there are 150,000 Telex machines in use in Britain – and more than 2 million worldwide. It's used to dramatically speed up business communications – it's just as quick as using the phone but far more efficient, because you have a hard copy of every "conversation" for your records.

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With *MicroLink* you don't HAVE to be in your office to send or receive Telex messages. You can just as easily use your computer at home (or even a portable). So now you can check whether there are any Telex messages waiting for you – anywhere, anytime. How's that for your business efficiency?

How to join:
Phone 0625 878888

U·P·D·A·T·E

Post Office backs technology centre

TRAIL-blazing parents and staff at a Hampshire comprehensive have provided their children with one of the most advanced technology centres to be found in Britain's schools. Wavell School, Farnborough, appealed for help to 150 national and local organisations. The Post Office came up with £65,000, Acorn Computers provided a further £10,000 and many other companies provided either cash or goods.

The result is The Post Office Information Technology Centre with 35 micros, peripherals and software in a suite of rooms.

The chairman of the Post Office, Sir Bryan Nicholson, went to Wavell to open the new centre which will be used by 700 pupils. "The challenge before industry and education is simple enough", he said. "We must create a properly trained and educated generation of young people equipped with the skills to develop our industry and commerce for the good of society. Nothing could be more worthwhile than that and nothing could represent money better spent".

The headmaster at Wavell, Robin Lees, told *The Micro User* of the difference the new centre had made to his pupils. "The effect is quite extraordinary. They have become far more motivated and of course they take up less teacher time. It is a much better learning environment. The micros are used across the whole sphere of education", he said.

The Wavell experience need not end there. The centre is already open to the local community for evening classes and according to Sir Bryan, seven local primary schools could be linked up with a computer in every classroom for as little as £2,000 a school.

Science programs back up TV

AN education officer with the BBC has gone out on a limb to make three science programs available for the Archimedes.

David Watkins asked BBC Soft to publish Archimedes versions of its Science Topics series which backs up schools television and runs on a BBC Micro or Master 128. But BBC Soft felt it was not commercially viable.

"I am convinced that there is a need for secondary science software for the Archimedes so I have produced this initial pack of three titles myself", said David. He is marketing the programs as Innocent Software (0494 462969) under a six month licence.

The three programs are Ecology and Conservation, the managing of a nature reserve, Relationships, which is about the control of malaria and Food and Population, concentrating on provision of adequate and balanced food supplies.

Pupils of Wavell School, Farnborough, tap into the databanks at the hi-tech information centre

They run in native Archimedes code and are on a single disc selling for £29.95.

Building for the future

LOOKING to the calibre of potential future employees, the Halifax Building Society has given more than £50,000 worth of Acorn equipment to schools in the Calderdale region. It has chosen the Archimedes which will be used for all aspects of information technology including word processing, spreadsheets, databases and desktop publishing.

"We want students from a wide range of disciplines to develop a more positive attitude to information technology", said Richard Frost, a senior programmer at the Halifax. "By working together using information technology as a creative tool, students also develop teamwork skills and gain experience for work by using advanced and powerful hardware and software relevant to the world of commerce and industry".

Teachers from 17 Calderdale schools joined Richard Frost for a residential training course run by Acorn.

Archimedes evaluated

THE power and versatility of the Archimedes in our classrooms is being evaluated by Acorn (0223 245200) and a number of education authorities and specialists.

Already more than 70 local education authorities have put the Archimedes into their schools or are committed to doing so in the near future, according to Acorn's education adviser, Roger Broadie.

All the fun of the fair

Ian Dickinson takes a fling on the swings

Product: Funfair
Price: £14. £16 (compact)
Supplier: Northern Micromedia Resources Centre, Coach Lane Campus, Coach Lane, Newcastle Upon Tyne NE7 7XA.
Tel: 091-270 0424

Points for

- **Plenty of work materials**
- **Simple and fun to use**
- **Excellent use of graphics**

Against

- **Disc intensive**

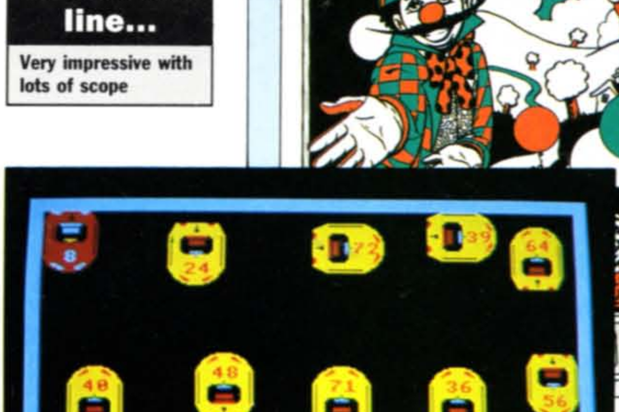
The bottom line...

Very impressive with lots of scope

WELCOME! One and all to ... the Funfair. That is the invitation on the cover of a software package produced by Northern Micromedia of Newcastle. It consists of two 40 or 80 track discs – or just one disc if you have a Compact – an A5 booklet and a collection of resource sheets. Also included is an overlay sheet for use with a Concept keyboard.

The idea is that you're given a specified amount of money to spend while exploring the delights of the funfair, while also solving problems. Success results in you being given vouchers, which are accumulated. At the exit you can exchange them for prizes – pictures related to the funfair which can be printed out on an Epson-compatible printer. The prize pictures are provided as part of the package and, if you don't have a printer, can therefore be photocopied and handed out instead of using the output.

WELCOME! ONE AND ALL! TO...
THE FunFair



Some of the numbers are in the same table as the red car. Can you bump them ?

Bumper cars at the fair

The program is straightforward: You choose the direction you want to go in using the arrow keys. On entering a stall a neatly drawn picture – always very colourful – is loaded from disc and displayed. Because the software is so disc-intensive there is no copy protection and working copies can be made for security.

When presented with a picture, pupils must make some sort of decision – it may be deciding what to buy or solving a problem related to the activity that they have just been involved with. These decisions can take the form of recall or answering some simple questions. You receive a voucher at this point for a correct answer.

The software is easy to master because of the limited number of keys used for input. And it's even simpler if you are lucky enough to own a Concept keyboard. Funfair is aimed at a wide range of ages and abilities, although pupils aged from 9 to 13 would make best use of it.

One of its great pluses is its versatility – the program can be tailored to suit individual needs. Also the teacher can easily alter the difficulty range from very easy to hard.

Although Funfair is primarily a package to develop basic skills in mathematics and language, it can be used as the pedestal for a whole range of other subjects and activities. Events that occur during the visit to the funfair can be used as a basis of discussion and investigation at a later stage, for example, putting rubbish into bins, distorting mirrors, fund-raising and a whole host of other topics.

Documentation comes in the form of a neatly presented A5 booklet. It has an uncluttered style, giving clear and concise instructions on how to use the package. The teacher's options are clearly laid out, showing exactly how to enter and change the requests of the program. It is possible, for example, to change the money that the pupil starts with from £1, £2 or £3. Also provided is a diagram outlining the areas of interest that Funfair can be used to introduce.

The last 12 pages are taken up with classroom reports and ideas for extension work. This is a useful section, giving some insight into the program's use. As well as this, there are 47 work/prize sheets. The whole package is presented in a sturdy A4 plastic file.

To sum up, Northern Micromedia has produced an excellent package at a very reasonable cost. At this price you will be hard pushed to get a better quality program for this age and ability range of pupils. Children find it easy and fun to use, and it is simplicity itself for the hard-pressed teacher to configure to individual requirements.

If you need a package for younger or less able children that will encourage various topics of conversation and investigation and also be fun to use at the same time, take up the invitation of Northern Micromedia and go for a trip to the Funfair.

Product: Funds
Price: £30.00 (mail order only)
Supplier: Dedicated Software, PO Box 116, Reading, Berkshire RG3 1BR.

Keeping account

Rog Frost steps into the daunting world of book-keeping

FOR some, the task of book-keeping is absolute child's play, but for others it's a complete nightmare. Dedicated Software has come to the rescue for people in the latter class with a very useful software tool called Funds. It is aimed at school administration and with the new Education Act giving total financial control to the school governors there could well be a need for such software. Its potential uses go even further though, with domestic or small business use being real possibilities.

What Funds does is set up 17 different accounts, each with its own meaningful name, which can contain up to £1,000,000 – in the black or red. The data can be stored on the original program disc or on a separate one.

It is menu-based, extremely easy to use and appears to have been written for the complete novice – there is no need to remember any codes or special key presses. Entering information is carefully controlled by the questions presented to you and each entry is checked by the micro to ensure that it is sensible.

With entries the program can't validate an *Are your sure?* message is displayed. There's even a corny little rhyme which tells you to press Return if you aren't pressing keys and nothing seems to be happening.

When you have titled all your accounts – you don't need to use all 17 of them – and have allocated them their initial balances, a printout is produced. Numbering starts at page one unless you choose otherwise and also carries the date that you entered. The intention is that you store all printouts in a ring binder so that they can be checked easily by auditors or accountants.

Having created accounts, the task of updating them – often weekly – starts. A batch of invoices and incoming cheques can be dealt with in one go. Again, it's merely a case of answering the on-screen questions to enter the information. Good quality printouts just happen as you complete each entry. They contain the title of the account, the date of the transaction, the reference number, the amount of money involved and the balance remaining.

If your work fills more than one page a new sheet is started and numbered automatically. At the end of your session a summary for all 17 accounts is printed and, once again, correctly page numbered.

Funds comes with a 32-page manual, which, like the program, is well produced. It is easy to read, and the authors seem to have thought of and found answers to every conceivable problem. The manual helps you through a training program and also gives information over and above that found on the disc Help files.

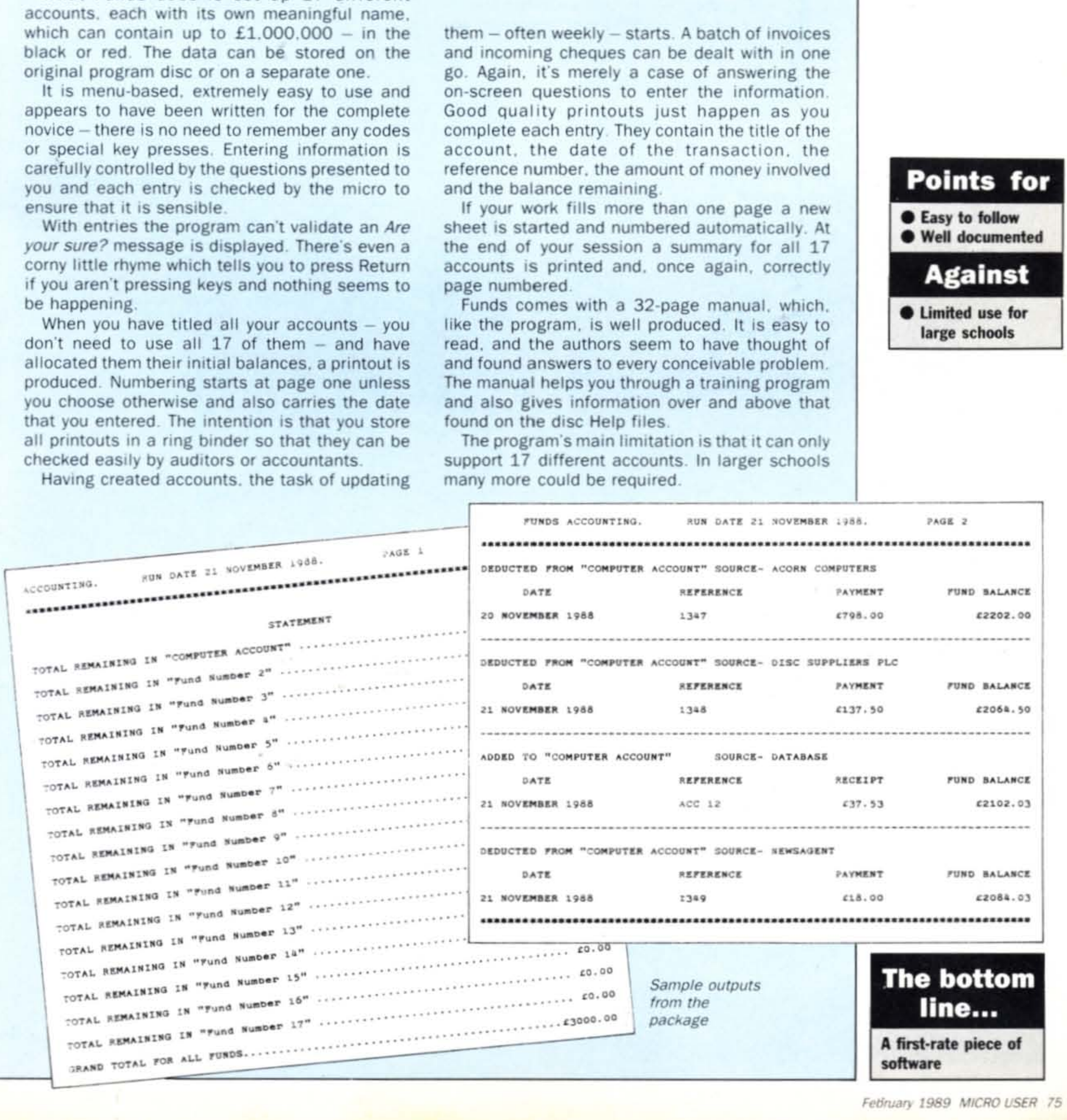
The program's main limitation is that it can only support 17 different accounts. In larger schools many more could be required.

Points for

- Easy to follow
- Well documented

Against

- Limited use for large schools



```
ACCOUNTING.        RUN DATE 21 NOVEMBER 1988.          PAGE 1
*****************************************************************

                             STATEMENT

TOTAL REMAINING IN "COMPUTER ACCOUNT" .......................
TOTAL REMAINING IN "Fund Number 2" ..........................
TOTAL REMAINING IN "Fund Number 3" ..........................
TOTAL REMAINING IN "Fund Number 4" ..........................
TOTAL REMAINING IN "Fund Number 5" ..........................
TOTAL REMAINING IN "Fund Number 6" ..........................
TOTAL REMAINING IN "Fund Number 7" ..........................
TOTAL REMAINING IN "Fund Number 8" ..........................
TOTAL REMAINING IN "Fund Number 9" ..........................
TOTAL REMAINING IN "Fund Number 10" .........................
TOTAL REMAINING IN "Fund Number 11" .........................
TOTAL REMAINING IN "Fund Number 12" .........................
TOTAL REMAINING IN "Fund Number 13" .........................
TOTAL REMAINING IN "Fund Number 14" ................................. £0.00
TOTAL REMAINING IN "Fund Number 15" ................................. £0.00
TOTAL REMAINING IN "Fund Number 16" ................................. £0.00
TOTAL REMAINING IN "Fund Number 17" ..............................£3000.00
GRAND TOTAL FOR ALL FUNDS.............................................
```

```
     FUNDS ACCOUNTING.      RUN DATE 21 NOVEMBER 1988.         PAGE 2
****************************************************************************
DEDUCTED FROM "COMPUTER ACCOUNT" SOURCE- ACORN COMPUTERS
     DATE                   REFERENCE                PAYMENT     FUND BALANCE
20 NOVEMBER 1988            1347                     £798.00         £2202.00
----------------------------------------------------------------------------
DEDUCTED FROM "COMPUTER ACCOUNT" SOURCE- DISC SUPPLIERS PLC
     DATE                   REFERENCE                PAYMENT     FUND BALANCE
21 NOVEMBER 1988            1348                     £137.50         £2064.50
----------------------------------------------------------------------------
ADDED TO "COMPUTER ACCOUNT"      SOURCE- DATABASE
     DATE                   REFERENCE                RECEIPT     FUND BALANCE
21 NOVEMBER 1988            ACC 12                    £37.53         £2102.03
----------------------------------------------------------------------------
DEDUCTED FROM "COMPUTER ACCOUNT" SOURCE- NEWSAGENT
     DATE                   REFERENCE                PAYMENT     FUND BALANCE
21 NOVEMBER 1988            I349                      £18.00         £2084.03
****************************************************************************
```

Sample outputs from the package

The bottom line...

A first-rate piece of software

Getting the pip

Phil Tayler makes his escape from the island

Pip's Island Adventure
Northern Micromedia

Product: Pip's Island Adventure
Price: £15
Supplier: Northern Micromedia, Resources Centre, Coach Lane Campus, Coach Lane, Newcastle Upon Tyne NE77 7XA.
Tel: 091-270 0424

THIS package has been put together by a group of teachers who have obviously used it within the school. Such sofware often lacks the professional touch, but Pip's Island Adventure has relevant content, excellent graphics and a good range of support materials.

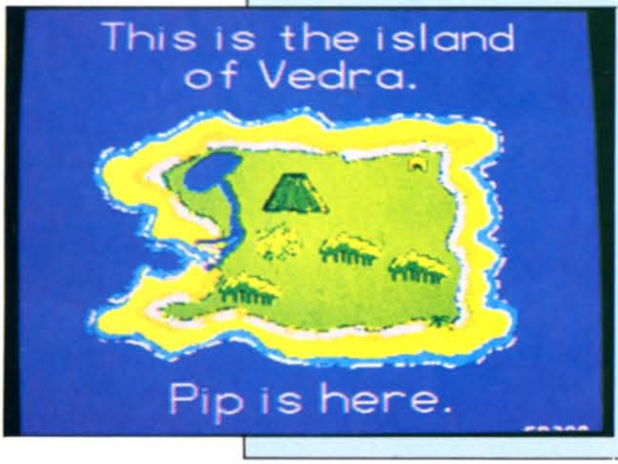
Pip has already been to the moon on a previous jaunt, so to many children he is already a classroom companion. Visually he seems to be a distant relation of that old favourite, Podd. Here he has been foolish enough to have been swept out to sea on an air bed. Fortunately an opportune island has saved him.

You must now rescue him: A task which involves solving a number of language and mathematical problems. The age range covers five to seven-year-olds and the beautifully drawn and coloured graphics will surely appeal. My class was fascinated and the youngest kept returning to his favourite parts again and again.

The program comes on three discs and care should be taken always to leave the current one in the drive. The discs reflect the three stages of the adventures: The crossing to the island, finding the lost charm of Vedra and the rescue of Pip.

In addition to the discs are a teacher's manual, introductory storybook and a vast array of photocopy masters including colouring, maths and language activities, as well as a number of simple games. The quality throughout is superb.

The first stage of the adventure asks you to decide how to cross to the island. The prepositions on, under and over are used to select from craft ranging from a raft to a helicopter. On the way two random hazards – from five possible – have to be negotiated. As an example, the octopus can only be beaten by eight correct answers to sums, the number range of which can be pre-determined. Several answers are allowed but after a number of incorrect responses you are asked to try and rescue Pip on another occasion. Unfortunately, a couple of the hazards are not logical, as in the case of the submarine being affected by a thunderstorm.


This is the island of Vedra.

Pip is here.

Reading the island

The next section introduces you to Vedra, who has lost a charm. If you can find this you will be rewarded with a map of the island. The activities here are much more fun and include a very simple version of Pacman-type mazes and Pelmanism ideas. Much hand and eye coordination takes place here and the children found the animation sequences very amusing.

Finally you will discover Pip in a pit or tied to a tree. One of three coloured paths can be chosen, each of which holds two hazards. One is random, whereas the other is determined by the route you tread. Recognition of colours, fruits and shapes are covered here as well as number bonds and the alphabet. After the random hazard is passed, you may select an item which will be needed to rescue Pip. The ladder helps at the pit, while the scissors cut the ropes. The torch and the key are mere diversions.

There are certificates for completing each stage and an ingenious cloze exercise. The text can be dumped to any Epson-compatible printer, with certain words omitted. This means that with a large class some could be working on the micro and others on the hard copy at their desks. Incidentally, all the way through a beautiful infant script is used. Written slowly to encourage reading along with the story, this is superbly implemented.

Though there are no fatal flaws in this package I cannot understand why the Break key has not been disabled. I would also like some control over the sound, though this is effective in many places it is annoyingly intrusive at others.

Otherwise this is a competently written and well programmed package which will be a useful addition to many infant classrooms. It does not allow for any flexibility on the teacher's part, for the problems cannot be easily altered, but the random choice element does ensure a good spread of activity.

The bottom line...

A useful package even though it's slightly flawed

Your technical questions answered by MIKE COOK

PROBLEM SOLVED

Plotting the future

I AM a fifth year GCSE technology student and I have decided to make a plotter for my BBC Micro. I've written a lot of software – utilities and adventures – but have never used the user port and I've been unable to find information on its commands or connections. I plan to drive the plotter with two motors and an interface but do I have to use stepping motors and drivers?

Also I have a original copy of Linear Graphics CAD program which I use in school on their plotter, so could I use this to control my plotter instead of writing my own software?

I am writing to you because my collection of *The Micro User* does not cover any of the subjects. – **Richard Russell, Harberton, Devon.**

● *If you turn to the back of the user guide you will find a list of connections for the user port. For driving it see the Body Build articles in October 1988 or July, August and September 1983. And the current series on the Experimenter's Board has lots of information on how to program the user port.*

You will need to use stepping motors unless you have some form of positional feedback, and for information on these see The Micro User *May 1984 and on DC motors see November 1985. You will have to write software to drive your specific hardware, so your existing CAD software will be of no use.*

Baulky printer

I CAN'T get my printer to work properly on my BBC Micro. It self-checks OK and the lead checks out on continuity. When I enter Control+B or VDU2, type in garbage until the buffer is full, type in more and switch the online switch on/off quickly I get the extra garbage on screen. So I'm getting the ACK correctly and I think it must be the strobe that's not getting through.

I believe that in the micro there is a transistor north of S1 which may have something to do with this but I'm not sure how to check it. I would be most grateful for some help. – **Dave Gwilt, Londonderry, N.Ireland.**

● *If you want to test the strobe transistor with a meter, make link S1 to the north and measure the voltage between the centre pin of the link and earth – the RF modulator box makes a good earth.*

Power the micro up and you will see about 1 volt at this point. Now power up the printer and it will rise to over 4 volts. If this does not happen there's something wrong with the lead or your printer. Now type in the following:

```
?&FE6C=&C
```

You should then see the voltage drop to zero – if it does the transistor works. Remember if you have tested the lead for continuity only and there might be a short circuit between adjacent pins. Also, just because the printer works on self-test it does not mean that the parallel interface portion is working.

Load of hot air

THE monitor screen for my issue 4 BBC B appears to keep steady in any low or medium mode but after 10 minutes in a high resolution the screen develops a prominent shimmer. This must be due to the heat instability effect of the video ULA because if cooling air is directed on to it the screen returns to normal again.

The ULA fitted on my micro is a Ferranti 8220 and I think I have seen some information in the past to the effect that this chip has given some trouble. I noticed that the video ULA fitted to a friend's micro was an Acorn VC2023, which seems to give no trouble at all in this respect.

As I use the 80 column mode fairly often should I replace the 8220 with the other type of ULA? – **Stephen Beaumont, Paddock, Huddersfield.**

● *Yes, the early Ferranti video ULAs did use a different grade of silicon that made them more susceptible to heat. Replacing this should cure your problem.*

Silence isn't golden

I HAVE a BBC Micro Issue 4 and have had no problems with it until recently when the sound cut out all together. I have checked for any loose connections but there are none. I have a Database Electronics Sound Master fitted.

I'd be most grateful if you could tell me what is

Turn to Page 78 ▶

On the agenda...

- **Building a driver for a plotting device**
- **Finding the fault in a printer**
- **Display problems – replacing the video ULA**
- **Getting a micro to make a sound**
- **X-raying a BBC Micro**
- **Getting more from the rom power drivers**
- **Setting the Master clock**
- **Making rom images work on a Master**

◄ *From Page 77*

wrong and if there is anything I could do to correct this fault. – **C. Lynn, Eggington, Beds.**

● *When any external equipment – like Sound Master – is fitted to a micro you should remove that first to ensure the fault is not there.*

Next, if the sound still doesn't work, you need to see if the audio amplifier is working, and this is quite easy. Turn your micro on, turn it over and find the 1MHz bus connector. Hold the metal shaft of a screwdriver and touch the 8th pin from the right hand side on the bottom row. This is the audio input and you should hear a slight click as you touch it – getting the pin wrong will not affect your micro.

If it doesn't click check the 5 volt supply – the purple wire connected to the edge of the main board. Test it with a voltmeter to see if it's producing a voltage, then test the speaker lead to check for any breaks.

If all this is fine the fault probably lies with the audio power amplifier chip – the 8 pin LM386 – or the nearby 14 pin LM324. If you do get clicks the probable cause is the sound generating chip – IC18, a 76489.

Scanning a micro

I WILL be going on holiday soon and I cannot bear to leave my micro at home. Would it harm any part of it or my disc drive if I put it through the X-ray machines at airports? – **David Adams, Lime Regis, Dorset.**

● *X-rays can, in large doses, damage electronic chips but the intensity of those used in security systems will do no harm to your micro.*

Power drivers

I OWN an issue 4 BBC B with Watford shadow ram and a full complement of roms. For some time I had been plagued with strange malfunctions after the micro had been on for half a hour or so. Some of the symptoms were:

- When listing programs, some lines would appear out of sequence on the right hand side of the screen.
- Random inexplicable error messages appeared when running programs.

These problems would disappear if any one of the roms was removed.

My attention was drawn to a letter that appeared in the August 1988 issue of *The Micro User* regarding overheating micro chips. It was suggested that a heatsink should be attached to IC14 – a 74LS245. This had the effect of delaying the onset of the malfunction until the machine had been on for about two hours.

After trying many solutions I piggy-backed two 74LS245s and fitted these in a low profile socket into the position for IC14. This increases the drive capability of the device and has appeared to completely eradicated the problem in my machine.

I hope this will help anyone else experiencing similar problems. – **M.R. Fryer, Fareham, Hants.**

● *While solutions will sometimes work, they are not to be always recommended and I would definitely not recommend this one because the two devices will be slightly different, say in switching time, and this can cause excess current spikes that could damage the chips. A much better solution is to fit a single 74ALS254 as this has a higher drive capability.*

Time to get a watch

I HAVE a BBC Master 128 and the clock has ceased to function. When I enter *TIME the following appears on the screen:

```
vI, FF  i  19FF. D2:28:27
```

and the printer is activated. The internal clock seems to be working because when I enter *TIME again the last two numbers progress:

```
vI, FF  i  19FF. D2:29:13
```

but the garbage doesn't translate into a meaningful date and time. The battery has been replaced and the computer re-configured satisfactorily.

Can you tell me what is the source of the problem, please? – **Hector Goodman, Beckenham.**

● *As a first step you could try using the Panel program to set the clock or program it directly with this short program:*

```
10 DIM X%32
20 X%?0=24
30 $(X%+1)="Mon,01 Jan 1989.00:00:00"
40 Y%=X%DIV256
50 A%=15
60 CALL &FFF1
70 *TIME
```

If this fails – and assuming you have a fresh battery – it points to a faulty clock chip. This is a 146818 RTC and would need replacing. It also contains a small amount of ram for the configure parameters.

Writing to ram

I HAVE recently upgraded to a Master and I am now having difficulty getting some rom images to function.

It has been suggested to me that this is because it requires write protection, so I would like to know if I can fit a write protect switch.

I would also like to know if it is possible to use the bank of sideways ram to function as a small ram disc and, if so, how is this possible? – **B. Jenkinson, Shebbear, Devon.**

● *It is not possible to simply fit a write protect switch to a Master because the ram used to store rom images and the main ram are physically the same device. Therefore any attempt to put a switch in the read/write line would interfere with the machine's normal operation.*

*It is possible to use the bank of sideways ram as a small ram disc in two ways. First you can load in a rom image containing prepared programs and then use the much neglected *ROM filing system.*

Alternatively you could buy the DFS and Advanced Quarter-Meg ram cartridge from PRES – 0276 72046 – that has the code for a ram disc of up to 256k.

Have you any hardware problems with your BBC Micro? If so, write to Mike Cook, The Micro User, Europa House, Adlington Park, Adlington, Macclesfield SK10 4NP, giving full details of your system and the problem.

Unfortunately, Mike cannot send you personal replies, but as many questions as possible will be answered on the pages of The Micro User.

Blocks and buckets

A mind-boggling strategy game from Mike Goldberg

THERE was a great fuss last year about that new, wonderfully original shape-fitting game from Russia. Well, here's our superb version of the same idea and it's quite simple to play. When you start a shape composed of four blocks appears above a big bucket and slowly descends to the bottom. As it drops you can move it to the left and right with Z and X, or rotate it with the spacebar.

When it comes to a halt another shape starts to fall, and the idea is to fit the blocks snugly together without any holes. When a complete line has been created it is removed by the little alien – and everything above it drops down to fill the space.

As your score builds up the shapes drop faster, giving you less time to work out where to position them. When the pile finally pokes up above the alien, the game is over. You score for completing a line – the nearer the bottom the better – and if the line is all one colour you get a 25,000 point bonus.

Programming the shape movement is quite easy – finding out whether it bumps into something is another thing altogether. The data for each shape is held in various arrays specifying which positions to check for each possible orientation of every combination of blocks.

The program is in two parts. Type in Listing I, check it using Get it Right! and save it as Skulls. Then enter Listing II, ensure it too, is right and save it as Sku2. Now you can CHAIN"Skulls" to play the game.

> *Here's our superb version of the same idea*

```
   10 REM Skulls (part 1)
   20 REM by Mike Goldberg
   30 REM (c) The Micro User
   40 MODE7:VDU23,1,0;0;0;0;
   50 VDU10,131,157,10,13
   60 FOR I%=0 TO 1:VDU141,134
   70 PRINTTAB(11)"== SKULLS ==":NEXT
   80 VDU131,157:PRINT
   90 FOR L%=1 TO 4:READ C%,n$:PRINT
  100 PROCprint(C%,n$):PRINT:NEXT:PRINT
  110 DATA 130,Stack the shapes falling
from the top of the screen into the box.
  120 DATA 131,When no more shapes fit t
he box then the game is over. However th
e shapes can be rotated on their descent
!
  130 DATA 129,The whole stack of shapes
 will drop down a line if you can make a
 complete line across the box.
  140 DATA 134,Extra points for a comple
te line all the same colour.
  150 VDU129,157,13,10,134:Y%=VPOS
  160 PRINTSPC3"Press SPACE for key inst
ructions"
  170 VDU129,157:REPEATUNTILGET=32
  180 VDU28,0,19,39,5,12,28,6,19,39,8
  190 PRINTSPC8CHR$130"Keys":PRINT'
  200 FOR L%=1 TO 6:READ a$,b$,c$
  210 PROCkey(a$,b$,c$):NEXT
```

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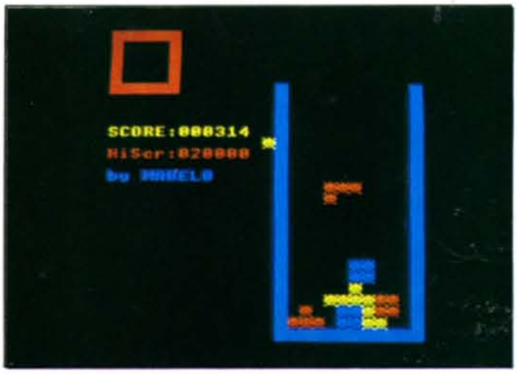
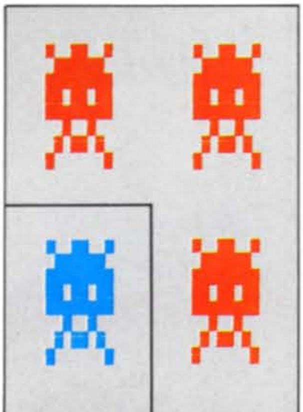
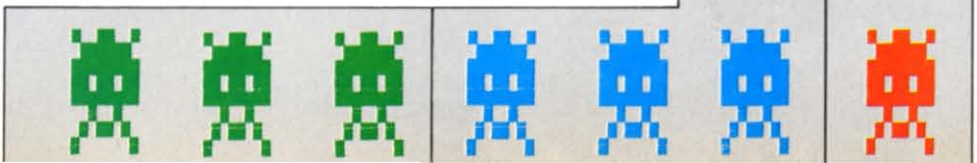
Listing I: Save this as Skulls



MAJOR VARIABLES	
X%,Y%	Position of shape
V%	Orientation of shape
x%(),y%()	Offsets to see if shape has touched down
L%(),R%()	Offsets to check whether object has collided to left or right
A%()	Offsets for collisions downwards
DX%(),DY%()	Offsets to examine for collisions if rotating.
game%	Flags whether game is over
end%	Shape can be moved flag
stop%	Flags shape has reached end of drop
f%	Counts number of skulls on a line
ok%	Flags whether skulls on line are one colour
old%	Holds colour of first skull on a line
no%	Flags whether a shape protrudes beyond the alien





Learning has never been such fun!

fun school 2

DATABASE
EDUCATIONAL
SOFTWARE

A computer is an ideal teaching tool for young children – if you have the right software.

Fun School 2 is available for three age groups: Under-6s, 6-8 years and Over-8s. Each pack consists of eight colourful and exciting programs carefully designed by a team of educationalists.

The computer itself monitors the child's progress. The skill level – initially set by parents – is automatically adjusted to suit the child's ability.

Now children can enjoy using their parents' computer while they learn at their own pace.

You can give your children an unfair advantage with Fun School 2 – it's the ideal way to introduce youngsters to the joys of using computers.

Detailed instructions are supplied with each pack giving educational help to parents and teachers, together with full instructions for each program.

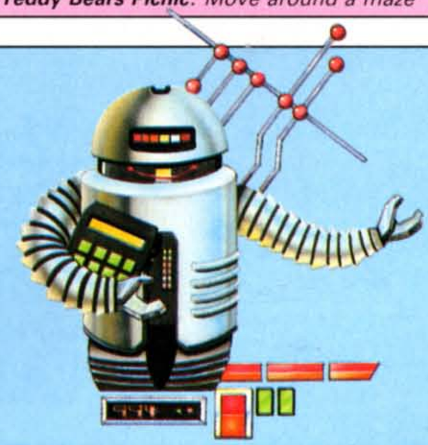
A colourful button badge with each package!

Fun School 2 for Under-6s contains:

- ***Shape Snap:*** *Colourful shape recognition*
- ***Find the Mole:*** *Experiment with number sizes*
- ***Teddy Count:*** *Ideal introduction to numbers*
- ***Write a Letter:*** *Creative fun at the keyboard*
- ***Colour Train:*** *Play at spotting colours*
- ***Pick a Letter:*** *Word building made easy*
- ***Spell a Word:*** *Enjoy naming the pictures*
- ***Teddy Bears Picnic:*** *Move around a maze*

Fun School 2 for 6 to 8 year olds contains:

- ***Number train:*** *Calculations made enjoyable*
- ***Shopping:*** *Which shops for which products?*
- ***Maths Maze:*** *Fun improving arithmetical skills*
- ***Treasure Hunt:*** *Introduction to coordinates*
- ***Bounce:*** *Get to grips with angles*
- ***Packing:*** *Discover tesselating shapes*
- ***Caterpillar:*** *Word building challenge*
- ***Number jump:*** *Have fun practising tables*



Fun School 2 for Over-8s contains:

- ***Build a Bridge:*** *Shape-fitting challenge*
- ***Passage of Guardians:*** *Enjoy anagrams*
- ***Unicorn:*** *First steps in problem solving*
- ***Logic Doors:*** *Mapping made easy*
- ***Souvenirs:*** *An introduction to travel*
- ***Code Boxes:*** *Discover binary arithmetic*
- ***Mystery machine:*** *Have fun breaking codes*
- ***Escape:*** *A final check on progress*

ORDER FORM

Please supply Fun School 2 on ☐ tape at £9.95* ☐ 5¼in disc at £12.95*
For ages: ☐ Under-6s ☐ 6-8 years ☐ Over-8s ☐ 40 track ☐ 80 track

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Adlington Park, Adlington, SK10 4YB.

R271

Get it right!

```
 10 =    0 0   180 = A297 8   350 = 661B 5
 20 =    0 0   190 = 4894 F   360 = D1B3 E
 30 =    0 0   200 = A8E8 F   370 = A2AB C
 40 = A8DF F   210 = 4F16 D   380 = 5748 E
 50 = 29BC F   220 = 33A4 3   390 = 8EEB F
 60 = 72B3 9   230 = 9F0F 2   400 = ED0F F
 70 = 80D1 9   240 = 6029 1   410 = DB15 B
 80 = D45B F   250 = C792 6   420 = 7337 4
 90 = 6C2F F   260 = FA0A B   430 =  CBE 6
100 = A6F9 E   270 = F150 0   440 = 72DC 1
110 = 9D54 1   280 = B962 4   450 = A540 3
120 = 3050 4   290 = E41C B   460 =  5B8 A
130 = 89F6 9   300 = C6F4 7   470 = 19E1 D
140 = E70E 3   310 = D5BF 0   480 = 98DC B
150 = 8D74 6   320 = 3B2B 0   490 = 27A0 9
160 = 29FF 7   330 = 2D61 C   500 = FB92 B
170 =  496 D   340 = 6D54 C   510 = ED0F 0
```

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```
  220 DATA Z,=,Move left
  230 DATA X,=,Move right
  240 DATA Space,=,Rotate
  250 DATA ,,
  260 DATA Delete,=,Pause
  270 DATA Copy,=,Restart
  280 VDU26
  290 PRINTTAB(4,Y%)CHR$134"== Press SPA
CE to load game =="SPC1
  300 ENVELOPE1,1,30,-20,30,40,20,20,126
,-1,-1,-5,120,90
  310 ENVELOPE2,1,4,-4,2,20,20,20,126,-1
,-1,-1,126,126
  320 ENVELOPE3,1,1,-1,0,2,2,0,126,-1,-1
,-1,80,70
  330 ENVELOPE4,1,20,-2,-1,90,30,50,126,
-1,-1,-1,120,120
  340 ENVELOPE5,2,40,50,30,5,5,5,126,-1,
-1,-1,126,120
  350 REPEATUNTILGET=32:CHAIN"SKU2"
  360 DEF PROCprint(C%,n$)
  370 REPEAT w$=FNword
  380 IF LENw$+POS>38 PRINT
  390 PRINTCHR$C%w$;:UNTIL n$=""
  400 ENDPROC
  410 DEF FNword
  420 LOCAL P%:P%=INSTR(n$," ")
  430 IF P%=0 w$=n$:n$="" ELSE w$=LEFT$(
n$,R%-1):n$=MID$(n$,P%+1)
  440 =w$
  450 DEF PROCkey(a$,b$,c$)
  460 LOCAL A%,B%,C%
  470 A%=129:B%=131:C%=134
  480 a$=RIGHT$(STRING$(6," ")+a$,6)
  490 b$=RIGHT$(STRING$(4," ")+b$,4)
  500 PRINTCHR$A%a$CHR$B%b$SPC3CHR$C%c$
  510 ENDPROC
```

```
   10 REM Skulls (part 2)
   20 REM by Mike Goldberg
   30 REM (c) The Micro User
   40 PROCreloc(&E00):MODE129
   50 DIMH$(1),V$(3),HS%(9),HS$(9),E$(1)
   60 FORI%=0TO9:HS%(I%)=20000-I%*1000
   70 HS$(I%)="MABEL"+STR$I%:NEXT
   80 VDU19,2,4;0;19,3,3;0;
   90 VDU23,1,0;0;0;0;
  100 VDU23,224,153,126,255,219,255,36,9
0,129
  110 VDU23,225,24,60,36,90,189,126,36,9
0
  120 VDU23,226,153,126,255,219,255,36,9
0,36
  130 VDU23,255,-1;-1;-1;-1;
  140 E$(0)=CHR$224:E$(1)=CHR$226
  150 PROCtable(0)
  160 DIM A$(3),A%(3,3)
  170 DIM L%(3,3),R%(3,3)
  180 DIM x%(3,3),y%(3,3)
  190 DIM DX%(3,3),DY%(3,3)
  200 REPEAT PROCinit:PROCscreen
  210 REPEAT PROCreadshape:PROCstart
  220 REPEAT PROCcheck:PROCdescend
  230 IF stop%=0 PROCkeys
  240 UNTIL stop%=1:SOUND1,3,90,1
  250 PROCscore((50-Y%)*2)
  260 IF delay%>10 delay%=delay%-1
  270 no%=0:J%=1020-7*32:FOR I%=15 TO 24
  280 P%=POINT(I%*32,J%):IF P%>0 no%=1
  290 NEXT:IF no% game%=1 ELSE PROCline:
C%=(C%+1)MOD3+1:R%=RND(7)
  300 UNTIL game%=1:SOUND2,4,100,1
  310 PRINTTAB(16,13)"GAME OVER"TAB(8,29
)"Press Space to continue...";
  320 REPEATUNTILGET=32:VDU28,15,26,24,3
  330 FORI%=1TO24:VDU30,11:NEXT
  340 VDU26:PROCwait(1)
  350 PROCtable(S%):CLS:UNTILFALSE
  360 DEFPROCinit:COLOUR3
  370 PRINTTAB(0,9)"SCORE:000000"
  380 dd$=RIGHT$("00000"+STR$HS%(0),6)
  390 COLOUR1:PRINTTAB(0,11)"HiScr:";dd$
  400 COLOUR2:PRINTTAB(0,13)"by "HS$(0)
  410 C%=1:S%=0:game%=0:delay%=100
  420 R%=RND(7):ENDPROC
  430 DEFPROCscreen:VDU28,14,27,25,5
  440 COLOUR130:CLS:VDU28,15,26,24,5
  450 COLOUR128:CLS:VDU26
  460 VDU28,0,5,5,0:COLOUR129:CLS
  470 VDU28,1,4,4,1:COLOUR128:CLS:VDU26
  480 PRINTTAB(0,29)"Press SPACE to star
t"
  490 COLOUR3:PRINTTAB(13,10)CHR$224
  500 REPEATUNTILGET=32
  510 PRINTTAB(0,29)SPC30:ENDPROC
  520 DEFPROCreadshape:LOCAL C%
  530 FOR I%=0 TO 3:A$(I%)="":NEXT
  540 PROCrestore(R%)
  550 FOR I%=0 TO 3:READ N%
  560 FOR J%=1 TO N%:READ C%
  570 IF C%=1 C%=224
  580 A$(I%)=A$(I%)+CHR$C%
  590 Q$=A$(I%):NEXT:K%=I%:PROCchk:NEXT
  600 FORI%=0TO3:FORJ%=0TO3
  610 READx%(I%,J%),y%(I%,J%):NEXT:NEXT
  620 FORI%=0TO3:FORJ%=0TO3
  630 READL%(I%,J%):NEXT:NEXT
  640 FORI%=0TO3:FORJ%=0TO3
  650 READR%(I%,J%):NEXT:NEXT:ENDPROC
  660 DEF PROCrestore(R%)
  670 IF R%=1 RESTORE 1160
  680 IF R%=2 RESTORE 1190
  690 IF R%=3 RESTORE 1210
  700 IF R%=4 RESTORE 1280
  710 IF R%=5 RESTORE 1350
  720 IF R%=6 RESTORE 1390
  730 IF R%=7 RESTORE 1480
  740 ENDPROC
  750 DEFPROCstart:X%=18:Y%=3:V%=0
  760 COLOUR1:O$=A$(0):start%=0
  770 PRINTTAB(X%,Y%)O$:ENDPROC
  780 DEFPROCkeys:LOCAL TT%,TU%
  790 TT%=TIME+delay%/10:REPEAT*FX21
  800 IF INKEY-99 PROCrotate
  810 IF INKEY-98 PROCm(-1)
  820 IF INKEY-67 PROCm(1)
  830 IF INKEY-90 REPEATUNTILINKEY-106
  840 PROCwait(.02):UNTIL TIME>TT%
  850 ENDPROC
  860 DEFPROCrotate:LOCAL T%,q%
  870 COLOUR0:PRINTTAB(X%,Y%)O$
  880 q%=V%:V%=(V%+1)MOD4:end%=0
  890 FOR T%=0 TO 3
  900 IF POINT((X%+DX%(V%,T%))*32,1020-(
((Y%+DY%(V%,T%))-2)*32))>0 end%=1:T%=3
  910 NEXT
  920 IF end%=1 V%=q% ELSE O$=A$(V%)
  930 COLOURC%:PRINTTAB(X%,Y%)O$
  940 PROCwait(.1):ENDPROC
  950 DEFPROCm(x%):end%=0
  960 y%=(Y%-2)*32:FOR I%=0 TO 3
  970 IF x%=-1 IF POINT((X%+x%+L%(V%,I%)
)*32,1020-y%)>0 end%=1
  980 IF x%=1 IF POINT((X%+x%+R%(V%,I%))
*32,1020-y%)>0 end%=1
  990 y%=y%+32:NEXT
 1000 IF end%=1 ENDPROC
 1010 COLOUR0:PRINTTAB(X%,Y%)O$
 1020 X%=X%+x%:COLOURC%
 1030 PRINTTAB(X%,Y%)O$:ENDPROC
 1040 DEFPROCdescend
 1050 IF stop%=1 ENDPROC
 1060 COLOUR0:PRINTTAB(X%,Y%)O$
 1070 Y%=Y%+1:COLOURC%
 1080 PRINTTAB(X%,Y%)O$:ENDPROC
 1090 DEFPROCcheck:stop%=0
 1100 FOR I%=0 TO 3
 1110 IF POINT((X%+x%(V%,I%))*32,1020-((
Y%+y%(V%,I%))*32))>0 stop%=1:I%=3
 1120 NEXT:ENDPROC
 1130 DATA6,1,1,10,1,11,1,12,9,1,11,11,1
,8,10,1,8,10,10,1,7,10,1,11,1,10,1,1,13,
11,11,9,1,10,1,8,8
 1140 DATA10,1,8,10,1,0,1,1,1,2,2,3,1,1,
1,2,0,2,2,3,-19,0,2,1,1,2,2,3,2,1,-1,1,2
,2,0,3,-19,30,30,0,2,2,2,1,2,30,30,1,0,1
,2,1,1
 1150 DATA30,30,3,2,2,2,1,2,30,30,1,3,1,
2,1,1
 1160 DATA8,1,1,1,8,8,8,10,1,9,11,1,1,8,
10,1,8,10,1,7,10,1,1,1,8,11,1,9,1,8,11,1
,8,10,10,1,1,0,2,1,1
 1170 DATA2,1,3,-19,0,0,1,2,2,-19,3,-19,
0,2,1,2,2,2,3,-19,0,2,1,2,2,-19,3,-19,-1
9,-19,0,0,-19,0,1,1,-19,-19,2,0,-19,0,0,
0
 1180 DATA30,30,2,0,30,1,1,1,30,30,2,2,3
0,0,0,1
 1190 DATA10,1,1,8,11,1,8,8,10,10,1,6,1,
1,8,10,1,1,10,1,1,8,11,1,8,8,10,10,1,6,1
,1,8,10,1,1,0,2,1,1,2,-19,3,-19,0,1,1,2,
2,2,3,-19,0,2,1,1,2,-19,3,-19,0,1,1,2,2,
2,3,-19
 1200 DATA-19,1,0,0,-19,-19,0,1,-19,1,0,
0,-19,-19,0,1,30,1,1,0,30,30,1,2,30,1,1,
0,30,30,1,2
 1210 DATA4,1,1,1,1,13,9,11,11,1,8,10,1,
8,10,1,8,10,1
 1220 DATA4,1,1,1,1,13,9,11,11,1,8,10,1,
8,10,1,8,10,1
 1230 DATA0,1,1,1,2,1,3,1,1,2,2,-19,2,-1
9,2,-19,0,1,1,1,2,1,3,1,1,2,2,-19,2,-19,
2,-19
 1240 DATA-19,-19,0,-19,1,1,1,1
 1250 DATA-19,-19,0,-19,1,1,1,1
```

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Listing II: Save as Skull 2

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```
 1260 DATA30,30,3,30,1,1,1,1
 1270 DATA30,30,3,30,1,1,1,1
 1280 DATA7,1,1,1,8,8,10,1
 1290 DATA11,9,11,1,8,8,10,1,1,8,10,1
 1300 DATA8,10,1,1,1,11,8,8,1
 1310 DATA11,9,11,1,8,10,1,1,8,8,10,1
 1320 DATA0,1,1,2,2,1,3,-19,0,1,1,2,2,-1
9,3,-19,0,2,1,2,2,2,3,-19,0,-19,1,2,2,1,
3,-19
 1330 DATA-19,-19,0,1,-19,1,0,1,-19,-19,
1,0,-19,1,1,1
 1340 DATA30,30,2,1,30,1,1,1,30,30,1,2,3
0,1,2,1
 1350 DATA7,1,1,8,8,10,1,1,7,1,1,8,8,10,
1,1,7,1,1,8,8,10,1,1,7,1,1,8,8,10,1,1
 1360 DATA0,2,1,2,2,-19,3,-19,0,2,1,2,2,
-19,3,-19,0,2,1,2,2,-19,3,-19,0,2,1,2,2,
-19,3,-19
 1370 DATA-19,-19,0,0,-19,-19,0,0,-19,-1
9,0,0,-19,-19,0,0
 1380 DATA30,30,1,1,30,30,1,1,30,30,1,1,
30,30,1,1
 1390 DATA9,11,1,8,10,1,1,8,10,1
 1400 DATA7,10,1,1,8,11,1,1
 1410 DATA9,11,1,8,10,1,1,8,10,1,7,10,1,
1,8,11,1,1
 1420 DATA0,1,1,2,2,-19;3,-19,0,2,1,2,2,
1,3,-19
 1430 DATA0,1,1,2,2,-19,3,-19,0,2,1,2,2,
1,3,-19
 1440 DATA-19,0,0,1,-19,-19,1,0
 1450 DATA-19,0,0,1,-19,-19,1,0
 1460 DATA30,0,1,1,30,30,2,1
 1470 DATA30,0,1,1,30,30,2,1
 1480 DATA6,1,1,1,8,10,1
 1490 DATA10,9,10,1,1,8,11,1,8,11,1
 1500 DATA6,1,8,10,1,1,1
 1510 DATA11,9,11,1,1,8,8,10,1,8,10,1
 1520 DATA0,1,1,1,2,2,3,-19,1,2,2,2,0,-1
9,3,-19,0,2,1,2,2,2,3,-19,0,-19,1,2,2,0,
3,-19
 1530 DATA-19,-19,0,2,-19,2,2,1,-19,-19,
0,0,-19,1,1;1
 1540 DATA30,30,2,2,30,2,2,2,30,30,0,2,3
0,2,1,1
 1550 DEFPROCline
 1560 LOCAL I%,J%,K%,f%,ok%
 1570 FOR J%=10 TO 26:PROCwait(.05)
 1580 VDU31,13,J%-1,32,8,10,224
 1590 PROCscanline(J%):NEXT
 1600 FOR J%=26 TO 10 STEP-1
 1610 VDU31,13,J%+1,32,8,11,224
 1620 NEXT:ENDPROC
 1630 DEF PROCscanline(J%)
 1640 LOCAL K%,f%,ok%,old%
 1650 K%=1020-J%*32
 1660 old%=POINT(15*32,K%)
 1670 IF old%=0 ENDPROC
 1680 FOR I%=16 TO 24
 1690 P%=POINT(I%*32,K%)
 1700 IF P%=0 I%=24 ELSE f%=f%+1:IF P%<>
old% ok%=1
 1710 NEXT:IF f%=9 PROCdoline
 1720 PROCwait(.05):ENDPROC
 1730 DEF PROCdoline:LOCAL c%,e%,s%
 1740 c%=1:e%=1:s%=1000+J%*10
 1750 IF ok%=0 PROCcolx:c%=2:e%=5:s%=250
00
 1760 PROCpiebald(J%):PROCscore(s%)
 1770 VDU28,15,J%,24,7,30,11,26
 1780 SOUNDc%,e%,90,1:PROCwait(.05)
 1790 ENDPROC
 1800 DEFPROCscore(w%):LOCAL L%
 1810 COLOUR3:S%=S%+w%:S$=STR$S%
 1820 L%=LENS$:PRINTTAB(12-L%,9);S%
 1830 IFS%>HS%(0)COLOUR1:PRINTTAB(12-L%,
11);S%
 1840 ENDPROC
 1850 DEFPROCpiebald(J%)
 1860 LOCAL C%,I%,Z%:COLOUR3
 1870 FOR I%=13 TO 24
 1880 PRINTTAB(I%,J%)E$(C%);
 1890 C%=ABS(C%-1):SOUND1,-14,90+Z%,1
 1900 PROCwait(.2):VDU127:Z%=Z%+8:NEXT
 1910 FOR I%=24 TO 13 STEP-1
 1920 PRINTTAB(I%,J%)E$(C%);
 1930 C%=ABS(C%-1)
 1940 PROCwait(.1):VDU127:NEXT
 1950 COLOUR2:VDU31,14,J%,255:ENDPROC
 1960 DEFPROCcolx:LOCAL I%
 1970 COLOUR3:COLOUR129:bo$="BONUS25000"
 1980 VDU31,15,J%:FOR I%=1 TO 10
 1990 VDUASCMID$(bo$,I%):PROCwait(.1)
 2000 NEXT:PROCwait(2):COLOUR128
 2010 ENDPROC
 2020 DEFPROCchk
 2030 COLOUR3:PRINTTAB(1,3)Q$:t%=0
 2040 FORi%=1TO4:k%=i%*32:FORj%=1TO4
 2050 P%=POINT(k%,1020-j%*32)
 2060 IFP%>0DX%(K%,t%)=i%-1:DY%(K%,t%)=j
%-1:t%=(t%+1)MOD4
 2070 NEXT:NEXT
 2080 FORi%=1TO4:PRINTTAB(1,i%)SPC4
 2090 NEXT:ENDPROC
 2100 DEFPROCtable(S%):COLOUR3
 2110 COLOUR130:CLS:PROCnewscore(S%)
 2120 PRINTTAB(5,7)"THE -SKULLS- ACE SCO
RE-TABLE":PRINT
 2130 FORI%=0TO9
 2140 PRINTI%+1") "HS$(I%)TAB(20)HS%(I%)
 2150 NEXT
 2160 PRINTTAB(8,29)"Press SPACE to star
t"
 2170 REPEATUNTILGET=32
 2180 COLOUR128:CLS:ENDPROC
 2190 DEFPROCnewscore(S%)
 2200 Z%=-1:REPEAT Z%=Z%+1
 2210 UNTIL S%>HS%(Z%) OR Z%=9
 2220 IF Z%=9 ENDPROC
 2230 FOR J%=9 TO Z%+1 STEP-1:K%=J%-1
 2240 HS%(J%)=HS%(K%):HS$(J%)=HS$(K%)
 2250 NEXT:*FX15
 2260 INPUTTAB(8,25)"Enter name:"n$
 2270 HS$(Z%)=LEFT$(n$,8):HS%(Z%)=S%
 2280 ENDPROC
 2290 DEF PROCwait(t):t=TIME+t*100
 2300 REPEAT UNTIL TIME>t:ENDPROC
 2310 DEF PROCreloc(Q%):P%=PAGE
 2320 IF(INKEY-256>1)OR(P%<=Q%)ENDPROC
 2330 L%=TOP-P%:*TAPE
 2340 FORI%=0TOL%STEP4:I%!Q%=I%!P%:NEXT
 2350 ?&13=?&13-(PAGE-&E00)DIV256
 2360 PAGE=Q%:RUN
```

Get it right!

```
  10 =    0 0
  20 =    0 0
  30 =    0 0
  40 = EEA9 9
  50 = 5D90 3
  60 = 76A2 4
  70 = 509C B
  80 = 977B 5
  90 = 8EF3 6
 100 = C144 A
 110 = AFDC A
 120 = C541 C
 430 = 70B7 1
 140 = 80F8 9
 150 = 5A95 B
 160 = 83EA 6
 170 = DF0E 4
 180 = B2FB A
 190 = 594A 1
 200 = 5633 3
 210 = CF5B B
 220 = 7129 F
 230 = 873C F
 240 = 5AE4 A
 250 = DF55 4
 260 = 9857 5
 270 = 2102 5
 280 = 32FC 1
 290 = C206 C
 300 = 3853 1
 310 = BE91 3
 320 = 4B60 7
 330 = 1618 5
 340 = 40F2 D
 350 = 872B F
 360 = 9AAB 2
 370 = 6CC0 5
 380 = FE64 F
 390 = CED1 1
 400 = 9383 9
 410 = 147C 6
 420 = 1706 9
 430 = 3A6E 9
 440 = DF36 4
 450 = 53F9 F
 460 = A75B 7
 470 = 7024 7
 480 = 5FAA C
 490 = CA90 3
 500 = 5B81 F
 510 = 2038 0
 520 = 212A 7
 530 = F863 1
 540 = 809C 8
 550 = 8FA3 A
 560 = DA5B E
 570 = 40B3 9
 580 = BA60 6
 590 = 478B B
 600 = 2E4B 5
 610 = 6B34 A
 620 = 2E4B 2
 630 = E3EF D
 640 = 2E4B 5
 650 = F1D5 3
 660 = 7A6D C
 670 = D444 9
 680 = 39D8 5
 690 = 3815 2
 700 = 83B4 F
 710 = 2DA2 4
 720 = 6A98 B
 730 =  7CD 2
 740 = ED0F C
 750 =  FB2 B
 760 = A094 E
 770 = 4064 E
 780 = 25F2 A
 790 = 2FB3 9
 800 = 1645 D
 810 = D223 0
 820 = E8E6 9
 830 = 3426 E
 840 = B246 7
 850 = ED0F 4
 860 = AE3E C
 870 = 1B01 C
 880 = 74D7 E
 890 = 67AF 9
 900 = 5658 4
 910 = 2C83 0
 920 = CCBD B
 930 = E6E7 F
 940 = 69ED 5
 950 = 9B54 C
 960 = 90F7 C
 970 = FE03 0
 980 = 9F3E C
 990 = DDC5 5
1000 = 2EF8 5
1010 = 1B01 8
1020 = DC3F B
1030 = 4064 A
1040 =  48E F
1050 = 15D4 0
1060 = 1B01 B
1070 = 94F3 5
1080 = 4064 E
1090 = 5C91 A
1100 =  C7F 5
1110 = 6DF6 4
1120 = E531 E
1130 = CCA0 B
1140 = EEC5 5
1150 = 4D0A 8
1160 = D602 A
1170 = 658F 1
1180 = F42D 0
1190 = 252A 1
1200 =  832 3
1210 = F6FE 2
1220 = F6FE 3
1230 = 4D4E 2
1240 =  795 7
1250 =  795 B
1260 = 1032 F
1270 = 1032 B
1280 = 91FE 4
1290 = A824 7
1300 = E4EA 9
1310 = F6F8 8
1320 = C2CB 4
1330 = EECB 7
1340 = C565 F
1350 = 4DD2 B
1360 = D76A 2
1370 = F66F B
1380 = 7AD3 7
1390 = 1F32 0
1400 = F980 B
1410 = 12A2 A
1420 = 2F7F D
1430 = 2F7F 1
1440 = 3896 E
1450 = 3896 3
1460 = 1697 B
1470 = 1697 A
1480 = 4A60 D
1490 = 8719 A
1500 = 266A 1
1510 = 413B 5
1520 = 4922 E
1530 = 992F 9
1540 = C121 8
1550 = 961E 6
1560 = 33ED 8
1570 = B0BA B
1580 = 5B73 2
1590 = DDAC D
1600 = D8BF 6
1610 = FA45 7
1620 = E531 D
1630 = 9C15 D
1640 = 29B4 B
1650 = 2C94 D
1660 = 3B8F 3
1670 = E857 7
1680 = 8DF9 8
1690 = F21F 0
1700 = A60D C
1710 = 603B 2
1720 = D0AA D
1730 = D853 3
1740 = EA85 3
1750 = B492 7
1760 = 89FF E
1770 = BFA5 3
1780 = 4832 2
1790 = ED0F B
1800 = 860D 9
1810 = D6BD A
1820 = B52E 7
1830 = 69E8 1
1840 = ED0F 4
1850 = 2934 B
1860 = 6D01 3
1870 = CEF8 3
1880 = 4E34 4
1890 = C8D0 F
1900 = 17F5 4
1910 = 6544 C
1920 = 4E34 F
1930 = 559A E
1940 = 6DB9 F
1950 = 3B32 2
1960 = 9D1D F
1970 = 7265 8
1980 = 95ED 9
1990 =  758 F
2000 = C6D2 B
2010 = ED0F B
2020 = F9C8 C
2030 = C1E4 7
2040 = 5011 B
2050 = E5AE 4
2060 = 4459 A
2070 = 24BD D
2080 = D0FF 6
2090 = E531 4
2100 = 4C45 2
2110 =  A4F B
2120 = 1BAC 1
2130 = 2964 8
2140 = 535C 5
2150 = 2C83 C
2160 = F49A E
2170 = 5B81 9
2180 =  6B7 7
2190 = 79E2 D
2200 = D6E0 F
2210 = 50E0 F
2220 = A110 7
2230 = E2D1 D
2240 = CFB8 F
2250 = FB45 1
2260 = CDD6 9
2270 = 75B9 B
2280 = ED0F 6
2290 = 292F 2
2300 = E9A6 F
2310 = A5E6 B
2320 =  8D8 C
2330 = 6F26 2
2340 = D690 9
2350 = A805 3
2360 = 73F1 4
```

Two for the price of one

Rory McCloy gets a new View and sees double

Product: DoubleView
Price: £39.95 to £49.95 depending on package
Supplier: Tubelink, PO Box 641, London NW9 8TF
Tel: 01-205 9393

EXTENDING a software package is tricky and improving a good one even harder. But Tubelink has taken View and built in some really impressive utilities. DoubleView comes as two 16k eproms, or rom images on disc for loading into sideways ram, depending on the package. There's also a professional manual of 32 pages which provides a clear and concise guide to the new utilities. It doesn't cover how to use View so a first time purchaser will need one of the View guides as well.

You need 16k of sideways ram in your micro for it to run and it's only really on a Master or a B+128 machine that you can avoid serious memory limitations. DoubleView is not compatible with the Tube and won't run on the Master Turbo co-processor.

The most obvious major change is the split screen facility enabling two documents to be edited at the same time see Figure I. The sizes of the two windows can be altered and the cursor shifted from one document to the other with Control+X, while Control+F will switch from the split screen to the current document occupying the full screen.

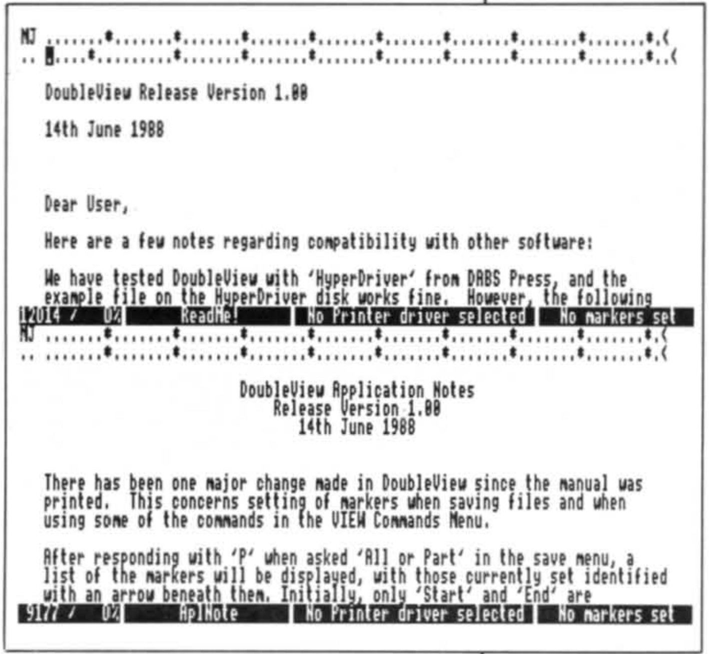
If you run DoubleView with memory-buffering the split document feature halves your available memory, so on my Master I had just 14,334 bytes free for each document.

However, you can set up DoubleView so that one document resides in memory and the other on disc, then when you switch to the other document the alternate one is automatically saved to disc. This technique of disc-buffering allows the expected full 28926 bytes of memory free for each of the two documents in DoubleView. Fortunately I have a hard disc and disc-buffering took place so quickly it was not a limitation, but it could become tedious with floppy discs. Tubelink does not recommend that DoubleView is used with tape.

Although the double document facility is a fundamental feature of DoubleView there are not many occasions when I find the need to edit two at once. However, some of the other features of DoubleView – see Table I – may well persuade you to buy it.

The powerful startup command *DBVIEW can be suffixed with multiple options – see Table II – so that your particular requirements are set for each of the two documents when you enter the

Turn to Page 84 ▶



```
MJ .......*.......*.......*.......*.......*.......*.......*.......*.......*.(
.. █....*.........*.......*.......*.......*.......*.......*.......*.......*..(

   DoubleView Release Version 1.00

   14th June 1988


   Dear User,

   Here are a few notes regarding compatibility with other software:

   We have tested DoubleView with 'HyperDriver' from DABS Press, and the
   example file on the HyperDriver disk works fine.  However, the following
12014 /   0%        ReadMe!        No Printer driver selected    No markers set
MJ .......*.......*.......*.......*.......*.......*.......*.......*.......*.(
.. .......*.......*.......*.......*.......*.......*.......*.......*.......*.(

                          DoubleView Application Notes
                             Release Version 1.00
                                14th June 1988


   There has been one major change made in DoubleView since the manual was
   printed.  This concerns setting of markers when saving files and when
   using some of the commands in the VIEW Commands Menu.

   After responding with 'P' when asked 'All or Part' in the save menu, a
   list of the markers will be displayed, with those currently set identified
   with an arrow beneath them. Initially, only 'Start' and 'End' are
9177 /   0%        AplNote         No Printer driver selected    No markers set
```

Figure I: The split screen

- Edit two documents simultaneously.
- Single or split screen with variable height windows.
- Updated status information window for each document.
- Cut and paste clipboard file.
- Automatic document saving at selected intervals.
- Pop-up menus for commands with help prompts.
- Multi-File system allows easy editing of long documents.
- Improved saving/write facility.
- Definable startup options.
- Configuration files.
- Screen options for colour and 80/106 columns.
- Multiple copies of documents printed automatically.
- Read/merge part of ViewSheet sheet.
- Works with Spellmaster, DFS, ADFS and Econet.

Table I: Features of DoubleView

Points for

- Some very powerful utilities
- Best on Master with hard disc

Against

- Severe hardware limitations

The bottom line ...

Very worthwhile if you need the special features.

◀ *From Page 83*

program. By making this command part of a !boot file on your workdiscs all you need do is just Shift+Break to go straight into editing.

The main screens each contain a status information window at the bottom which reports the bytes free, the position of the cursor expressed as a percentage of the way through the document, the document name, the printer driver selected for that document (which can be different for the two documents) and the number of markers set.

For those familiar with View, the Command mode screen has gone and is replaced with a series of pop-up windows. Pressing Escape brings up the main menu window, shown in Figure II, and the cursor keys will move the highlighted selection up and down the menu. Alternatively you can select the choice by pressing the first letter of the menu option, but I found it very frustrating that this only moved the highlight to that option and you still had to press Return to activate it.

View commands – see Figure III – are chosen from the first option of the main menu and are selected once again by moving the highlight to a command and pressing return to activate it. A useful addition to this menu are the Help instructions which appear in the window as each command is selected. Various status information is also seen, including the document name, the printer driver selected and the status of microspacing, folding and the field.

Loading a document into the current edit screen is performed by Control+N and a pop-up window appears with the current disc catalogue filenames listed. Loading can be by typing the filename or moving the highlight to the appropriate name on the catalogue listing and pressing Return. Control+S saves a document and there are options in pop-up windows to select all or part of the document. The slow WRITE command of View has been re-written, and DoubleView saving is both faster and more sophisticated. Locked files can be over-written but only after a warning prompt and acknowledgment.

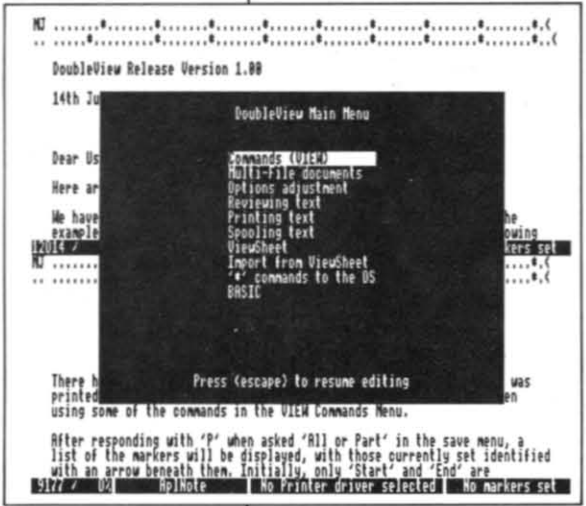
DoubleView contains many new facilities, and I particularly like the automatic saving of both documents. The Options Menu can be used to alter the timing of the saving from 1 to 99 minute intervals and the specific directory tree for the filenames to be saved. Tubelink has called this auto-recover, perhaps misleadingly, as you will only lose what you have typed in since the last automatic save took place. This could be a lot if the saving interval is set too long during a busy editing session. With my hard disc, automatic saving took place almost imperceptibly, so I could have a fairly short save interval.

-A	Full sceen height for each document.
-B	Background colour.
-C	Cursor flash rate.
-D	Disc buffering.
-DP	Prefix for disc swap files.
-F	Folding status for both documents.
-F1	Folding status for document one.
-F2	Folding status for document two.
-L	Number of lines for document one.
-M	Screen mode 0 or 3.
-O	Load options file.
-P	Load printer driver.
-R	Set auto save recovery file time.
-S	Set the Setup options for both documents.
-S1	Set the Setup options for document one.
-S2	Set the Setup options for document two.
-T	Text colour.
-U1	Multi-File name for document one.
-U2	Multi-File name for document two.
-W	106 columns wide screen.

*Table II: Startup options for *DBVIEW*

Another major feature of DoubleView is the ClipBoard. This allows full cut-and-paste editing, with marked blocks of text easily saved to a ClipBoard file and moved to the other document if desired or returned later to another part of the current document. Multiple cut-out sections of text are added to each other in the ClipBoard file.

Tubelink claims that the re-writing of the routine for displaying text achieves a 35 per cent increase in speed of screen updating and scrolling. However, on my Master this change was not appreciable and I found the new system caused a flickering effect on scrolling which was not as acceptable as the original.



```
DoubleView Release Version 1.00

14th Ju

Dear Us

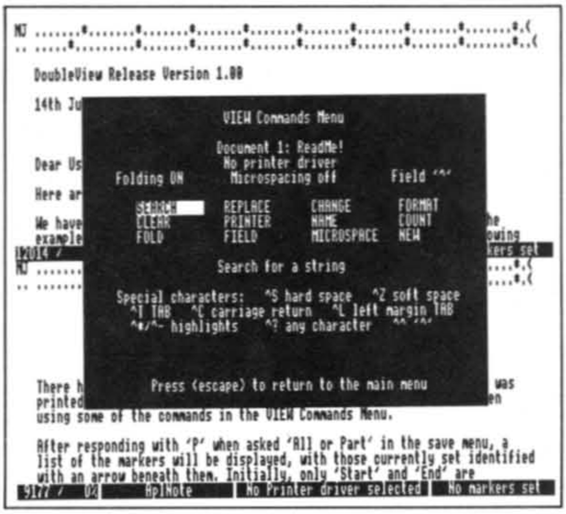
Here ar

We have                                                    he
example                                                    owing

There h                                                    was
printed                                                    en
using some of the commands in the VIEW Commands Menu.

After responding with 'P' when asked 'All or Part' in the save menu, a
list of the markers will be displayed, with those currently set identified
with an arrow beneath them. Initially, only 'Start' and 'End' are
9177 /   02 |      HplNote      | No Printer driver selected | No markers set
```

Figure II: The main menu



```
VIEW Commands Menu

Document 1: ReadMe!
No printer driver
Folding ON        Microspacing off        Field "^"

SEARCH      REPLACE     CHANGE      FORMAT
CLEAR       PRINTER     NAME        COUNT
FOLD        FIELD       MICROSPACE  NEW

Search for a string

Special characters:   ^S hard space   ^Z soft space
  ^I TAB   ^C carriage return   ^L left margin TAB
  ^*/^- highlights    ^? any character    ^^ "^"

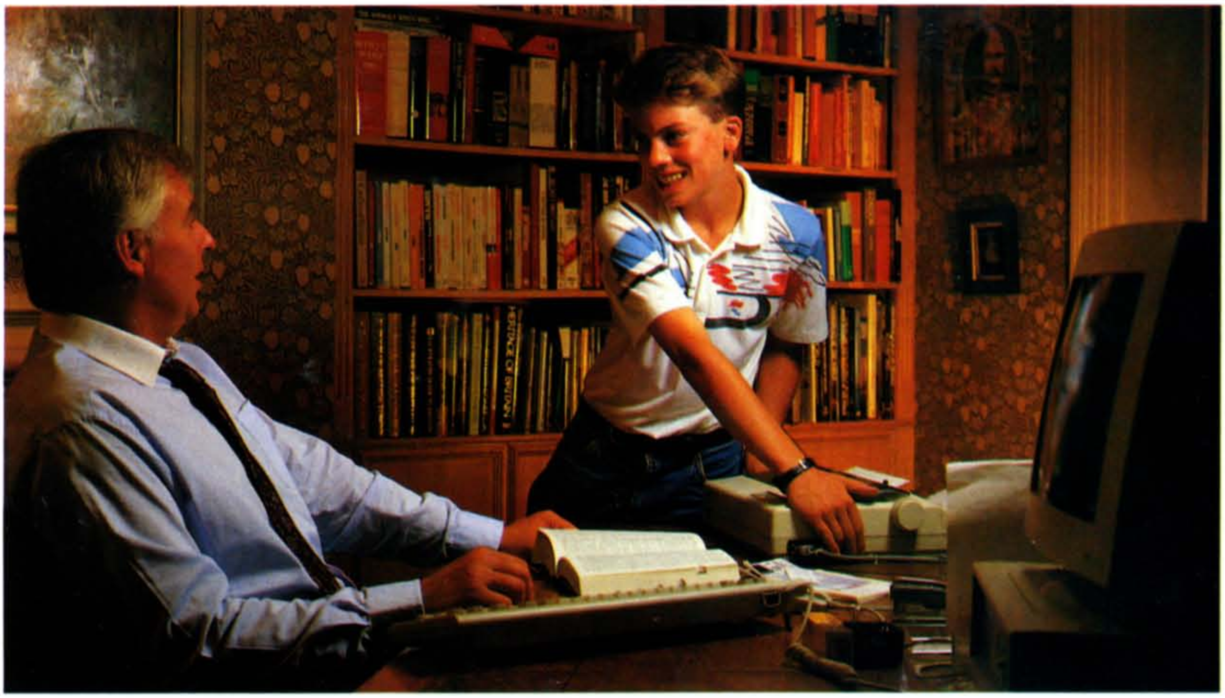
Press (escape) to return to the main menu

using some of the commands in the VIEW Commands Menu.

After responding with 'P' when asked 'All or Part' in the save menu, a
list of the markers will be displayed, with those currently set identified
with an arrow beneath them. Initially, only 'Start' and 'End' are
9177 /   02 |      HplNote      | No Printer driver selected | No markers set
```

Figure III: The View commands

The day Daniel's dad brought his office printer home.



My dad's firm is always busy so he has lots of LC-10 printers at his office.

In fact, he sometimes has so much work to do that he keeps a personal computer in his study so he can bring work home.

But when he's really busy, he brings home one of those Star printers too.

Of course, I know exactly how to use them because we have the colour version at school.

It can print documents in six different colours.

So I'm not surprised WHAT MICRO? called the LC-10 the 'Best Budget Dot Matrix Printer' on the market.

What's more it's a lot less expensive than other printers but much better quality.

(My friend, Philip, even has one for his Commodore.)

For a start the front control panel is child's play.

The six different fonts give you so many different style options when you print things.

It's pretty fast too with a draft elite speed of 144 cps and high density near letter quality at 36 cps.

There's also the LC-10's special feature called 'push-tractor' which gives the lowest tear-off position of the paper.

And you can park continuous paper and automatically load single sheets – and I think that's unique for this sort of printer.

You know, if I keep my paper round going for a few more weeks I'll soon have enough to buy my own LC-10.

And then for a small fee, dad can borrow mine.

THE star COMPUTER PRINTERS

Star Micronics U.K. Ltd.
Craven House, 40 Uxbridge Road,
Ealing, London W5 2BS.
Telephone: 01-840 1800.
A division of
Star Micronics Co., Ltd., Japan.

Please send me details of the Star LC-10 business printers.

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Company ______________________________

Address ______________________________

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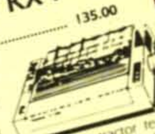

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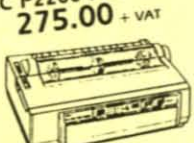

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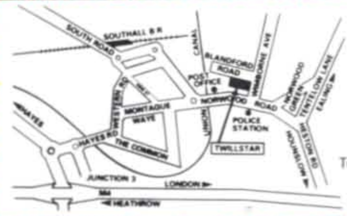

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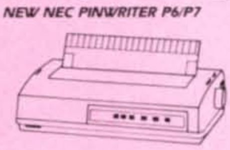

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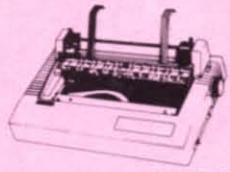

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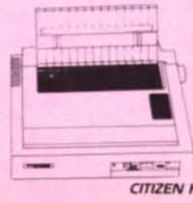

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Program protector

Mike Cook shows how to keep the pirates at bay

THE protection of software is a thorny area and one where the technical press has to tread very carefully. Software houses have, understandably, been known to take exception when magazines have published details of how to make backup copies.

Any discussion of protection techniques could be looked on as a tutorial in how to break protection because no system is absolute. I like to say that software protection is like a ball of string – you can't tie any knots that cannot be untied.

What most systems try to achieve is that the undoing of the knot will be so time-consuming and require such technical knowledge that the effort involved will outweigh the cost of the package. Of course there will always be people who hack into protection just for the challenge, but there are also a few unscrupulous souls who want to pass someone else's programs off as their own.

Another problem of software protection is that it normally involves an intimate knowledge of the specific machine or operating system. This means that when a compatible micro is launched or a new operating system or filing system is used, the protection system fails to allow the software to run.

One way of helping legitimate, but technically naive, users to protect their software is the Black Box approach. This is a system or program that will render the software uncopyable. One appeared in the April 1987 issue of *The Micro User* in an article by Chris Nixon and contained a system of protecting up to seven programs on a disc. Once protected, these could not be copied, backed up or loaded and it served as a good overall protection system.

People require different levels of protection, and I have been getting letters lately asking for a way to make programs unlistable. This plea comes from people who don't mind other folk having their programs or passing them on, but who want to make sure that they are not tampered with and that their name lives on embedded in them.

There are many ways of introducing a signature – some section of code or memory that reveals the name of the author – into a routine. For example, the command *AUTHOR could be implemented to reveal the names of the people who wrote the software. I know of at least one case of software piracy that went to court and was won when the plaintiff proved that the programs sold contained his name.

Of course if you make the name easily visible any thief could easily change it, so the trick is to scramble it in some way.

One favourite way is to Exclusive Or your signature with a keyword or phrase – only when you repeat the process with the same key is the signature revealed.

Another technique – which has even been used on review software sent to *The Micro User* – is to alter all the variable, procedure and function names to variations on some sequence of letters. For example, they could be changed to variations of the name of the person buying the program. So, if the buyer is Fred Bloggs you could change variables like this:

Original	Altered
buffer	fredbl
circle	Fredbl
value	fredB

You could even write a program to do the replacements for you. It can make people very wary of giving copies away to anyone else – just in case the programmer comes across a person who has a copy which doesn't contain the right name.

The most secure professional types of signature and protection are tailored to an

Turn to Page 88 ▶

> *If you make the name easily visible any thief could easily change it*

◄ From Page 87

individual program, using its unique features to weave the protection around. However, in reply to everyone who has been asking me for a way to make programs unlistable, I have come up with the solution shown in the listing.

As you can see, I have adopted the Black Box approach in that the heart of the program is in machine code stored in decimal in data statements. This means you will have to go to considerable effort just to look at what the machine code does to be able to write a program to reverse the process.

Using the program is simple: Type it in, ensure you've made no errors using Get it Right! and save it. When you run the routine you are asked how many lines you want to protect and at what intervals the protected lines should be. Note that these intervals are the number of lines between the protected ones – line numbers are not taken into account.

Protecting a line increases its length and you are told by how much. If you are running close to the micro's memory limit the extra protection may well exceed the amount of ram available. So in a short program you could afford to protect more lines than a long one.

Don't worry about the unprotected lines – if someone can reconstruct your program from those they are probably clever enough to have written it themselves.

When you have answered the questions, the routine installs the protection patch. To use it you simply load in the program you want to protect and press function key one. In a short time the prompt will re-appear and then you can save the protected version. Make sure you use a different name or disc to save the protected program, as there is no simple way to un-protect it.

Once protected, you will be able to treat it like a normal program for running, loading and copying. However you will not be able to list it and it will be very difficult for you to alter the code.

As a final note, I would remind you of an ancient Egyptian proverb: *A lock only ever stopped an honest man.* By protecting your listings you are making a statement of ownership and warning all who trespass that they are considered dishonest.

> *“I have adopted the Black Box approach”*

```
   10 MODE7
   20 PRINTTAB(0,3)"Program Protector"
   30 PRINT"By Mike Cook"
   40 PRINT
   50 PRINT"This stops a program from be
ing listed"
   60 PRINT
   70 PRINT"1) Load the program you want
 to protect"
   80 PRINT"2) Press function key 1"
   90 PRINT"3) Save the protected progra
m"
  100 PRINT:PRINT
  110 INPUT"How many lines to protect ",
P%
  120 IF P%>240 OR P%<2 THEN PRINT"RANGE
 OF 2 - 240":GOTO 100
```

```
  130 PRINT"This will add ";P%*8;" bytes
 to the code."
  140 PRINT"OK ? (Y/N)";
  150 A$=GET$
  160 IF A$<>"Y" THEN GOTO 100
  170 PRINT:PRINT:PRINT"At what line inc
rement do you want"
  180 INPUT"to protect the lines ",N%
  190 IF N%>40 OR N%<1 THEN PRINT"RANGE
OF 1 - 40":GOTO170
  200 *KEY1CALL &A00:M
  210 FOR A%=&A00 TO &AC7
  220 READ B%
  230 ?A%=B%
  240 NEXT
  250 ?&A01=N%
  260 ?&A07=P%
  270 PRINT:PRINT"PROTECTION PATCH NOW I
NSTALLED"
  280 END
  290 DATA169,3,133,135,133,137,169,10
  300 DATA133,136,169,131,32,244,255,232
  310 DATA134,128,132,129,169,132,32,244
  320 DATA255,202,134,130,136,136,132
  330 DATA131,160,2,177,128,133,134,160
  340 DATA0,177,128,201,255,240,78,165
  350 DATA134,201,247,176,35,160,2,200
  360 DATA177,128,201,220,240,26,201,221
  370 DATA240,22,201,32,240,241,160,2
  380 DATA177,128,24,105,8,145,128,32
  390 DATA125,10,32,164,10,76,90,10,32
  400 DATA183,10,166,134,202,32,183,10
  410 DATA202,208,250,160,0,177,128,201
  420 DATA255,240,17,160,2,177,128,170
  430 DATA198,135,208,233,165,137,133
  440 DATA135,198,136,208,164,96,165,130
  450 DATA133,132,165,131,133,133,160,0
  460 DATA177,132,160,8,145,132,198,132
  470 DATA165,132,201,255,208,2,198,133
  480 DATA165,129,197,133,208,232,165
  490 DATA128,197,132,208,226,96,32,183
  500 DATA10,162,8,160,2,189,190,10,145
  510 DATA128,32,183,10,202,208,245,96
  520 DATA230,128,208,2,230,129,96,66,58
  530 DATA34,03,21,34,61,36,95,34,0
```

Get it right!

```
 10 = 8AFC C | 190 = 530C E | 370 = 7C13 8
 20 = 1281 C | 200 = 70DB 9 | 380 = 7673 2
 30 = FC23 5 | 210 = 8657 9 | 390 = 94C5 D
 40 = FF3E 3 | 220 = 9D3E E | 400 =  D20 F
 50 = C46D B | 230 = 4220 A | 410 = 73F8 A
 60 = FF3E D | 240 = 2C83 D | 420 = A3AD 8
 70 = D984 2 | 250 = F43E 2 | 430 =  DA6 3
 80 = 1734 C | 260 = F3DB C | 440 = F2F1 A
 90 = 4D52 6 | 270 = C7F4 F | 450 = 665D E
100 = C102 2 | 280 = FD2E 2 | 460 = BB7A B
110 = 3DEC E | 290 = 88BB 2 | 470 = 7118 3
120 = DAE3 C | 300 = 42D4 A | 480 = 94A8 5
130 = D76C 8 | 310 = B8C9 A | 490 = 6B68 A
140 = 1E4A F | 320 =  11B 2 | 500 = A4C6 F
150 = 77F2 D | 330 = F5DD 2 | 510 = DE85 0
160 = 5E93 4 | 340 = 38F4 3 | 520 = C104 7
170 = CB13 4 | 350 =   E7 C | 530 = 535B D
180 = 539F E | 360 = BC07 1 |
```

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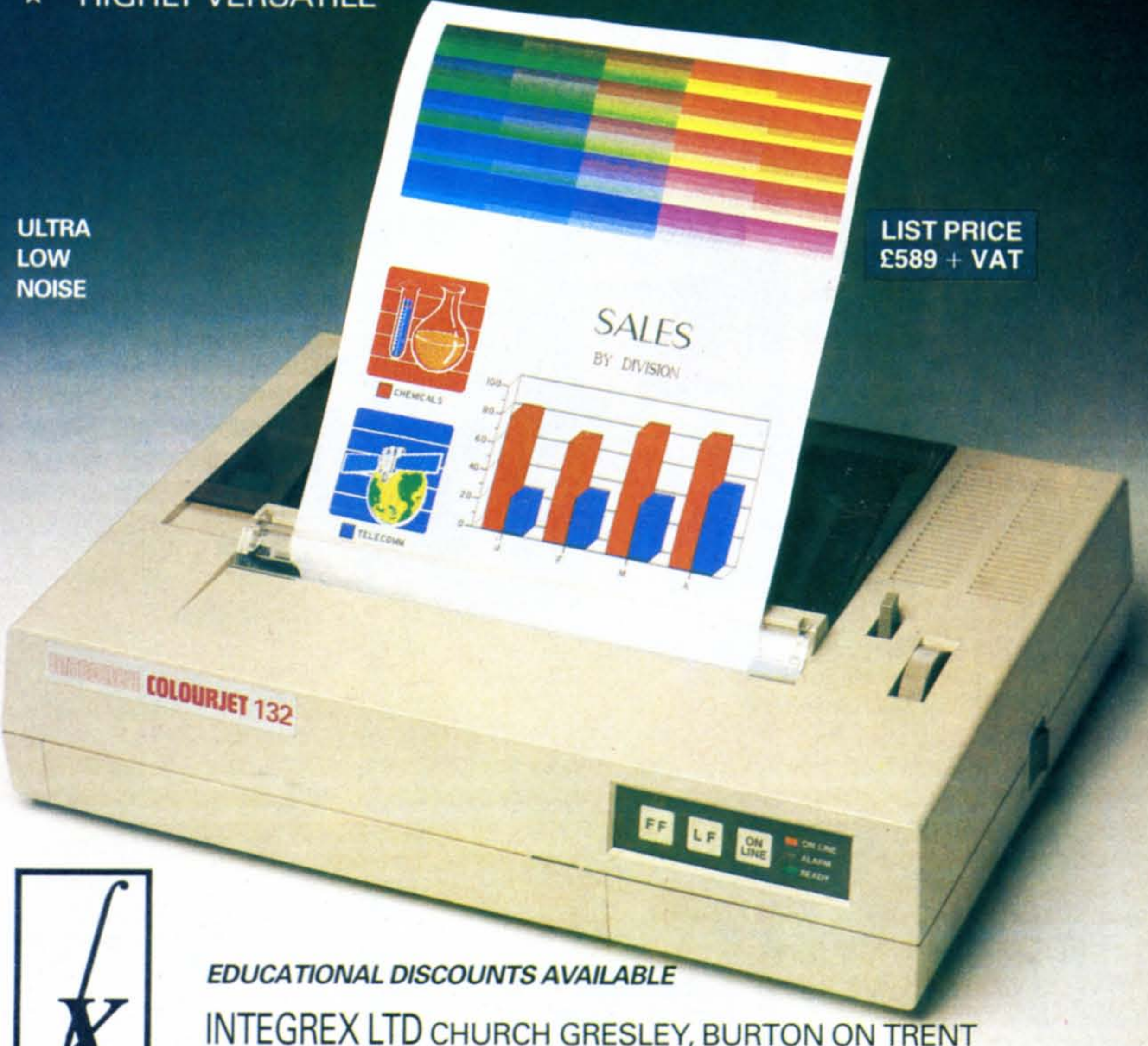
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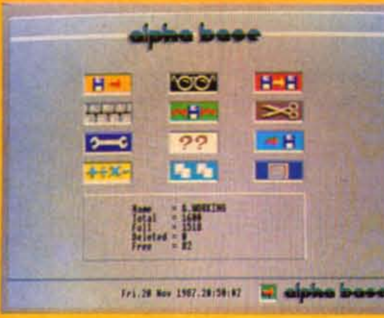

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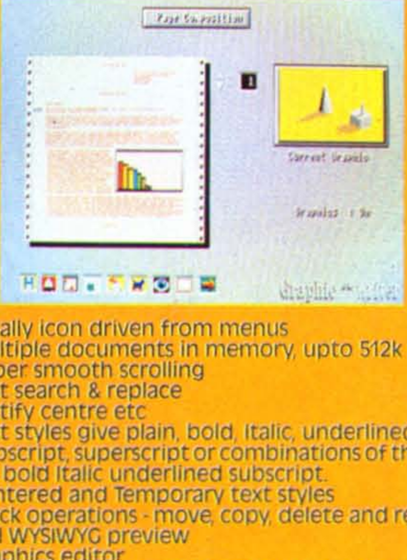

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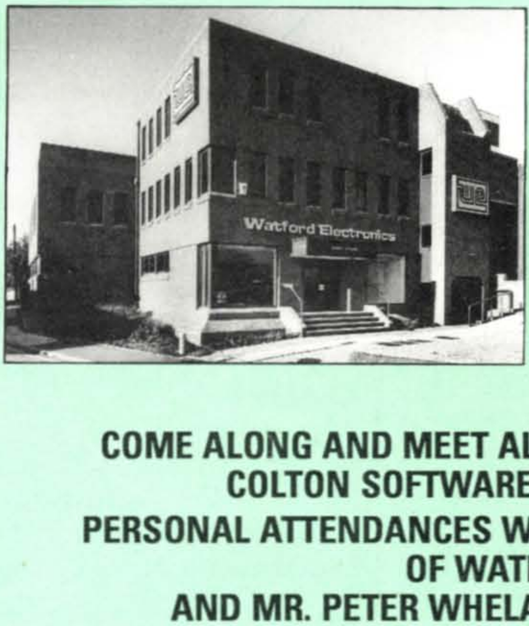

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Filestore E60S	**£1080**	Ecolink	**£270**

BBC MASTER COMPACT

System 1	Standard Package	**£299**
System 1A	System 1 + TV Modulator	**£315**
System 2	System 1 + Green Hires Monitor	**£345**
System 3	System 1 + Medium Res Colour Monitor	**£469**
RS232 Kit for BBC Compact		**£25**
Additional 3½" Drive for BBC Compact (Securicor carriage £7)		**£90**

65C102 2nd PROCESSOR

This amazing package consists of the Acorn 65C102 'Turbo' Board, the Watford Co-Pro Adaptor and Acorn 1.2 DNFS ROM. The 'Turbo' board, running at 4MHz with 64k of additional RAM will increase the speed by between 50 and 200% depending on the application running, and allow a BASIC program of upto 44k in any screen mode. Simply by plugging in the Co-Pro and the DNFS ROM with its special Tube host code and you massively increase the power of any Model B. This is a complete package, with its own power supply, ready to interface with your BBC Micro.

£159

Continued →

Z88 Sinclair's Portable Micro

The worlds first, truly portable Micro. It is A4 size, only an inch thick and weighs under 2lbs. Ideal for use when travelling or as a personal organiser.

Only: £239

FREE

With every Z88 purchased from us this month, we are giving away absolutely FREE, a Z88 to BBC Interface Link, 4 rechargeable batteries and a compact Mains Battery Charger worth £38.

ACCESSORIES

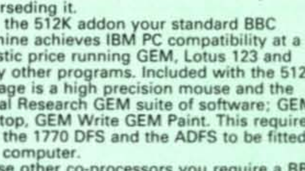
Mains Adaptor	£8.65
32K RAM Pack or 32K EPROM Pack	£17.35
128K RAM Pack or 128K EPROM Pack	£43.40
512K RAM Pack	£169
Z88 Spellmaster for Pipedream	£51
Z88 to BBC Link	£21.70
Z88 to PC Link II	£30
Z88 to Macintosh Link	£49
Z88 EPROM ERASER	£34.75
Serial Printer Cable	£8.65
Parallel Printer Cable	£24.00
Z88 Modem	£145
Z88 Soft Carrying Case	£8.50
Sinclair Z88 Computing Book	£9.95
AA Nicad Rechargeable Battery	£1.50
Battery Charger, Compact & Fast (3 Hours)	£6

Z88 PACKAGE OFFER

This special offer package consists of: A Z88 Micro, 128K Ram pack, Mains Adaptor, Carrying Case & a Set of Kodak batteries.

Only £289

CO-PRO Adaptor



With this Watford's Co-pro Adaptor unit, you can now attach any BBC Master's coprocessors to your original BBC B.

Use the super fast Turbo Board with your BBC B, it is much faster than the 6502 2nd processor superseding it.

With the 512K addon your standard BBC machine achieves IBM PC compatibility at a realistic price running GEM, Lotus 123 and many other programs. Included with the 512k package is a high precision mouse and the Digital Research GEM suite of software; GEM Desktop, GEM Write GEM Paint. This requires both the 1770 DFS and the ADFS to be fitted to your computer.

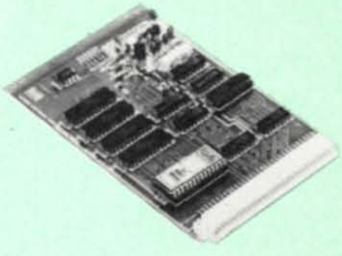
To use other co-processors you require a BBC B with DNFS 1.20 or higher, or BBC B+ fitted with 1770 DFS 2.20 or greater. Co-processors work exactly like a second processor.

Master owners may use Co-Pro to add a second Co-processor externally.

Watford, brings power to your BBC at only:

£35 (carr £5)

Archimedes Real-Time Digitiser



Watfords' Archimedes Video Digitiser is the most sophisticated digitiser ever designed for a micro. It provides a fast and flexible means of capturing images from a video camera or recorder for display and manipulation on the Archimedes range of Micros. Off-air television signals may also be digitised via a video recorder or TV tuner.

Once captured, Video images can be stretched, squahsed, rotated, stored on disk, printed, or used by applications software.

Applications include desktop publishing, graphics, animation, image analysis and recognition, medical imaging, automatic inspection and measurement, databases, interactive video, remote transmission of pictures via a modem, movement detection ... or anything else you can think of!

SPECIFICATION

SOFTWARE

All the driver software for the digitiser is contained in a ROM on the podule. Facilities provided include:

- Grabbing of images to the screen or dumping to memory.
- Continuous grabbing and display for previewing or camera alignment.
- 'Hot key' grabbing – pressing a (configurable) key combination grabs and displays an image on the screen while another program (e.g. paint software such as Artisan) is running.
- Scaling (zoom/shrink) any section of an image to any size in X and Y directions, with optional X/Y flip, window clip and logical (AND/OR/XOR) plotting.
- Rotation and scaling to any angle and size, rotating about any point, with optional window clip, and logical (AND/OR/XOR) plotting.
- Very versatile matrix printer screendump facility for Epson FX, LQ and EX compatible printers – pictures can be printed to ANY size (including multiple sheets) at any orientation, using any available printer density and one of six internal sets of dot patterns, or with user definable patterns (pattern editor supplied). The screen-dump can also be used for general purpose graphics screen printing.
- Pixel value lookup tables: pixel values can be passed through a user defined lookup table to allow contrast enhancement, thresholding pseudo-colouring etc.
- Smoothing and noise spot removal to enhance image quality.
- Creation of sprites from all or part of a digitised image.
- Saving and loading of digitised images in compressed format.
- Combination of pictures by adding, avaraging, subtracting, multiplication etc.
- Much faster versions of the Arthur *ScreenLoad and *ScreenSave commands.

Software facilities are accessed via operating system star (*) commands and SWI calls. High resolution screen modes using MultiSync type monitors are supported.

UTILITY DISK

A disk is included, containing sample pictures, examples and utility programs including the following:

- Colour image grabbing using colour filters with monochrome or colour cameras, including colour balance adjustment and scaling facilities.
- Pattern editor for 2 colour display modes and printer screendumps.
- 512 line interlaced display for non MultiSync monitors.
- Thresholding to create two colour images.
- Capture and replay of animated sequences.
- Several example programs illustrating the use of digitiser software.

RESOLUTION

Images are digitised to 512 (h) x 256 (v) pixels, and then scaled to fit the Archimedes' screen. It is possible to digitise to 512 x 512 pixels if the picture is stationarv for about 0.1 second. 512 x 512 images can either be displayed on a MultiSync monitor, or on a normal monitor using interlacing.

Pictures are digitised to 64 levels of grey (6 bits). Note, however, that it is only possible to display all 64 levels on a monochrome monitor, or a colour monitor which has a composite (CVBS) input. For this reason, the Philips CM8533 monitor is recommended instead of the standard Archimedes monitor. It is also possible to connect both a colour and a monochrome monitor at the same time.

Any 2,16 or 256 colour graphics mode can be used to display digitised pictures. In two colour modes, grey levels are represented using dot patterns, which may be redefined if required (a pattern editor is supplied).

Cont.

SPEED

Video fields are captured in real time (1/50th sec.), and then transferred to Archimedes' memory or the screen. The grab/display rate is dependant on the screen mode and picture size, up to 25 fields per second for quarter screen images, or 12.5 per second for fullscreen (Mode 9).

HARDWARE

The digitiser is a single width podule, with a BNC socket on the rear panel for the video input, which may optionally be terminated via a link. There is 128K of on-board memory to store the digitised image, and a 32K ROM on the podule contains all the driver software.

Automatic video level control and black level clamping circuitry is used to ensure that the optimum contrast is obtained from a variety of video sources. A filter is included to avoid patterning effects when using colour sources.

Price £249

Watford Dealers' List

UNITED KINGDOM

Alpha Microtec Ltd, 321 Stratford Road, Shirley, Solihull, West Midlands. Tel: 021-745 8998.

Badger Micros (Devon), Badger's Hill, Southerton, Ottery-St. Mary, Devon EX11 1SE. Tel: 0395 68516.

Beebug Retail, Dolphin Place, Holywell Hill, St. Albans.

Cambridge Computer Store, 4 Emmanuel St., Cambridge CB1 1NE. Tel: 0223 358264.

Cirkit Distribution Ltd, Park Lane, Broxbourne, Herts.

HCCS, 575-583 Durham Road, Low Fell, Gateshead, Nr. Newcastle Upon Tyne. Tel. 091 4870760.

Mancomp Ltd, Printworks Lane, Levenshulme, Manchester. Tel: 061-224 1888-9888.

Microman Computers, Pasture Lane Farm, Pasture Lane, Rainford, St. Helens, Merseyside WA11 8PU. Tel: 074488 3667.

The Computer Depot, 205 Buchanan Street, Glasgow G1 2JZ. Tel: 041-332 3944.

Verospeed Ltd, Boyatt Wood, Eastleigh, Hants.

OVERSEAS DEALERS

*Absolute Electronics, Rewal House, 208-210 La Trobe Street, Melbourne, 3000, Victoria, Australia. Tel: (03) 663 2411.

Computer Distribution Company, Parklaan, 47, 8-9300 Aaist, Belgium.

E.B.N., Elisenstrasse 13, 1000 Berlin 41. Tel: (030) 7952057.

Lendac Data Systems, Unit 31, IDA Enterprise Centre, Pearce Street, Dublin 12. Tel: 710796.

Lindis International Ltd, Wood Farm, Linstead Magna, Halesworth, Suffolk. Tel: 098 685 476.

Scientex P.V.B.A., Zilversmidstraat 2, B-2000 Antwerpen, Belgium, Tel: 03 233 59 06.

Techno-matic Data, Holbergsgade 19, 1057 Kobenhavn K, Denmark.

*Velobyte, Scheaedyksadyk 5a-6a, 3011 EB Rotterdam, Holland, Tel: (010) 413 8197/414 5171.

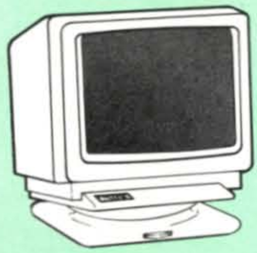
Viking Tecno, Vestergade 12.1, 9620 Aalestrup, Denmark, Tel: 08 642522.

*Acorn/Watford Referral Centres.

Watford Electronics are Appointed & Authorised DEALERS / REPAIR CENTRE for Acorn Computers Ltd Cambridge Computers Ltd Microvitec Monitors Panasonic Printers

Continued →

MONITORS & SWIVEL BASES



All Monitors are supplied complete with BBC connecting leads FREE.

MICROVITEC 14"

● 1431 – Standard resolution as used on the BBC television computer programme	£175
● 1451 – Medium resolution, suitable for word processing in mode 0	£219
● 1441 – High res, exceeds the capabilities of the BBC micro	£359
● 1431AP RGB + PAL and AUDIO	£199
● 1451AP RGB + PAL and AUDIO	£255
● **2030 CS 20" Med Res**	**£380**
● **2040 CS 20" Hi Res**	**£675**
● Dust Cover for Microvitecs	£5.50
● **Touchtec 501 Touch Screen**	**£239**

TAXAN 14"

● **TAXAN Super Vision 2 Type 620** Hi-res RGB Colour monitor. Ideal for Wordprocessing	£263

14" MULTISCAN COLOUR

● TAXAN Multisync 770 Plus	£449
● EIZO Flexscan 80605 – For technical info. read the review in Micro User, Jan. '89	£459
● NEC JC-1402P – Multisync II	£459

NEW

Aries 1458 14" Multisync

Aries 1458 is a state of the art, stylishly finished, flat screen, Enhanced Multiscan Colour Monitor. An auto-switching device changes modes without having to adjust the monitor (it also works in monochrome). Its wide frequency range (15-45KHz) and multi-colour display allows increased options and flexibility. 0.31mm dot pitch. Input Signal: TTL/Analogue, H-Sync 15-45KHz; V-Sync 47-100Hz; Bandwidth 35MHz; Resolution 800 x 600 Hi-resolution Multi colour Display; Display Colours CGA-16, Mono-Green (3 levels), EGA 64, Analogue – limited only by the video display adaptor; Built-in tilt and swivel base.

Launch offer **£379**

NEW

SPECIAL OFFER

AMBER MONITOR

BT MERLIN/Acorn 12" Hi resolution Amber monitor. Ideal for wordprocessing. Consealed front panel mounted controls. Illuminated mains on/off rocker switch. Supplied complete with BBC Cable.

Only £49
(Offer valid while stocks last)

N.B. carriage on Monitors **£7** (securicor)

SPARE LEADS

BNC Lead for Zenith or Philips	£3
Skart Monitor Lead	£5
RGB lead for TAXAN Monitors	£3
Archimedes Colour Monitor Lead	£7.50

By placing your monitor on one of our professional swivel bases (see monitors drawing on the left), you gain the freedom to adjust the monitor viewing angle to suit your needs and thus alleviate eye strain and reduce back stress. The front mounted adjustable control dial makes adjusting the monitor viewing angle very simple.

for 12" Monitors **£7** (carr. £2.50)
for 14" Monitors **£10** (carr. £2.50)

PHILLIPS

● BM7502 12" Hi-res Green Monitor	£65
● CM8833 14" Med. Res Colour Monitor	£219

STAR BUY

● **PHILLIPS 14"** Medium Res, dark glass, attractively finished Colour Monitor – supplied complete with RGB, SKART and Audio/Phono Inputs. A push-button switch toggles between Hi-Res monochrome green text mode and full colour display. Has Composite Video Input. (Please state the type of Connecting Lead you require).

ONLY £199

Dust Cover for Phillips Monitors	£6

Anti-Glare VDU Screen

These extremely effective, easy to install, 12" & 14" VDU screens eliminate harmful glare, improves contrast on colour monitors. Increases productivity in offices. A must for all wordprocessor users. Hundreds of these screens are in daily use in various branches of one of the leading High Street banks.

£12

TAXAN KP-815 PRINTER

80 column, Bi-directional, 160 CPS, (NLQ 24cps); Friction & tractor feed + paper roll holder as standard; Epson FX compatible.

Offer Price £155

Taxan KP915 132 Column Printer
£275 (carr £7)

RS232 Interface	£49
RS232 Interface with 2K Buffer	£69
RS232 Interface with 16K Buffer	£89

Panasonic KX-P1081

Attractively finished in BBC beige. Bi-directional, logic seeking. Has IBM and Epson RX compatible command calls. Speed: 120CPS draft mode, 24 CPS NLQ mode. Character width range from 5 cpi to 17 cpi. Upto 40 downloadable characters. Functions include, Proportional spacing, Justification, centering and left & right ranging.

(Price inludes, FREE a 4ft Printer Lead, and a Dump Out 3, Screen Dump ROM worth £35 with every printer purchased from us).

Special Price: **£145** (carr. £6)

Optional RS232 Interface:	£39

RS-232 GENDER CHANGERS

Male to Female	£4.95
Male to Male	£4.95
Female to Female	£4.95

Panasonic KX-P4450 LASER PRINTER

Latest technology at affordable price. Prints 11 pages a minute, Two A4 size paper bins, Serial & Parallel ports, 512K Buffer – expandable to 1.5Meg, 15 Character LCD Display, Diablo 630, Epson FX-286, IBM Proprinter, HP Laserjet emulations, 5K pages per month duty cycle.

ONLY £1,625

NEC P2200 PINWRITER

24 pin; 80 column; 168CPS – 56CPS LQ; Epson LQ compatible, 7K Buffer; 7 resident FONTS, Friction & Tractor feed, front load single sheet feed, etc.

Price: **£269**

FREE Cut Sheet Feeder worth **£65** with every P2200 printer purchased from us this month)

Pinwriter Serial Interface	£55
Additional Font Cartridge	£25
NEC P2200 Pinwriter Ribbon	£6

NEC PINWRITER P6/P7 Plus

The Ultimate matrix Printer for Business.

24pin printhead; Print speed, 265cps Draft, 90cps LQ; Inbuilt Tractor & Friction feed; A paper park & low tear facility; 20 inbuilt FONTs; A font cartridge facility; 80K of Printer Buffer; Colour option available; P6 is 80 column & P7 is the wide 136 column.

P6 Plus 80 columns	£439	P7 Plus 136 columns	£575
Colour Option	£74	Serial Interface	£73
Cut Sheet Feeder	£125		

Star LC10	**£175**	**LC10 Colour**	**£225**

EPSON PRINTERS

EX800	£405	LQ850	£430
EX1000	£545	LQ1050	£589
FX850	£315	LQ2500+	£839
FX1000	£425	LX800	£175
GQ3500 Laser	£1249	SQ2500	£975
LQ500	£285		

PLOTTERS

Hitachi 672 Colour Plotter	£475
Plotmate Plotter A4S	£379
Plotmate Plotter A3M	£549

CUT SHEET FEEDERS for

EX800 **£149;** EX1000/LQ2550 **£210;** FX800 **£149;** FX1000 **£179;** LQ/LX800 **£139;** LQ500 **£75;** LQ850 **£135;** LQ1050 **£175.**

TRACTOR FEED for

EX800/1000 **£85;** LQ800 **£44;** LQ850 **£69;** LQ1050 **£85;** LQ2500 **£195**

ACCESSORIES

● EX800/1000 Colour Option	£55
● EX800/1000 Colour Ribbon	£18
● LQ2500 Colour Option	£65

(Securicor Carriage on Printers £7

EPSON PRINTER INTERFACES

All these interfaces fit inside the printer.

RS232	£32	RS232 + 2K Buffer	£52
IEEE 488	£40	RS232 + 8K Buffer	£79

Universal Printer Sharers/Changers

Connect upto 5 Micros to 1 printer or 5 Printers to 1 Micro with our combined, Sharer/Changer. These Units are made to a very high standard. For extreme reliability, they all have Printed Circuit Boards mounted inside the case, (not a Spagetti Junction of wires). Internal connection is made via high quality ribbon cables.

(Ideal for School environments.)

Connects	Serial	Centronics
2 to 1	£22	£23
3 to 1	£30	£32
5 to 1	£40	£42

(Cables extra at £6 each. Please specify type required when ordering)

INTEGREX COLOUR JET PRINTER

● Colour Jet 132 Printer	£515
● Paper Roll	£6
● Screen Dump Software	£10
● Colour Cartridge	£14
● Black Cartridge	£8
● 100 A4 OHP transparencies	£55
● 8K Serial Interface Optional	£99

Professional Printer Stand

This new professional printer stand takes hardly more space than your printer. Due to the positioning of the paper feed and re-fold compartments ie. one above the other, the desk space required for your printer functions is effectively halved. Additional facilities include: Easy access to paper from both sides, used with both top and bottom feed paper and with its dial controlled paper feed system with adjustable deflector plates it ensures smooth paper flow and automatic refolding.

***80 Column version £23** (carr. £2.50)*
***132 Column version £26** (carr. £2.50)*

PRINTER LEADS

BBC Centronics 4' long	£5
BBC Centronics 6' extra long	£7
Compact's Special Centronics Lead	£7
Archimedes Printer Lead 1 meter	£7
IBM Parallel Lead 1 meter	£7
Double Ended 36 way Centronic Lead	£9
RS232 Leads (Various)	P.O.A.

PRINTER RIBBONS & VARIOUS DUST COVERS

Type	Ribbons	Dust Covers
BBC Micro	–	£3.50
BBC Master	–	£4.00
Archimedes Micro pair	–	£9.00
IBM PCs pair	–	£6.00
Brother HR15/20	£3.00	£5.00
DMP2000	£3.75	£4.75
EX/LQ800	£4.50	£4.50
EX/LQ1000	£7.50	£5.00
RX/FX80/85/800/MX80	£3.90	£4.95
RX/FX100/1000	£5.75	–
Kaga/Taxan KP810/815	£4.90	£4.00
LC10 (Black)	£4.25	£5.00
LQ500/800	£3.75	£5.00
LQ1050/LQ2500	£8.50	£5.50
LX80/86/800	£3.80	£4.50
M1009/GLP	£3.80	£3.75
Panasonic KX1080/81	£4.00	£4.75
SQ2500	£23.00	£5.50
Star NL10	£3.75	£4.50
Olivetti Ink Jet Cartridges (set of 4)	£9	

Our attractive Dust Covers are manufactured from translucent PVC. The seams are stitched and edges are taped to prevent splitting due to continuous use.

Listing Paper (Perforated)

● *1,000 Sheets 9½" × 11" Fanfold Paper*	***£7***
● *2,000 Sheets 9½" × 11" Fanfold Paper*	***£12***
● *1000 Sheets 9½" x 11" NCR 2 Part Fanfold*	***£19***
● *1,000 Sheets 15" × 11" Fanfold Paper*	***£9***
● *1000 Sheets true A4 Fanfold Paper*	***£11***
● *2000 Sheets true A4 Fanfold Paper*	***£19***
● *Teleprinter Roll (Econo paper)*	***£4***

(All our Fanfold paper is Micro perforated leaving a smooth clean edge when the tractor feed strips are detached).

Carriage 1K Sheets £2.50. 2K Sheets £3.00

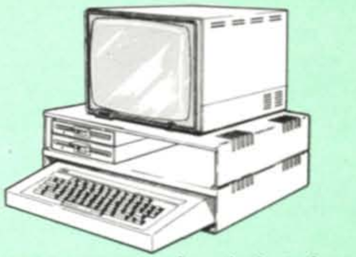
PRINTER LABELS

(On continuous fanfold backing sheet)

1,000 90 × 36mm (Single Row)	***£5.00***
1,000 90 × 36mm (Twin Row)	***£4.90***
1,000 90 × 49mm (Twin Row)	***£7.50***
1,000 102 × 36mm (Twin Row)	***£6.25***

Carriage on 1,000 Labels £1.00

PLINTHS FOR BBC MICRO, MASTER & PRINTERS

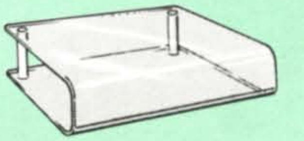


Protect your computer from the heat of your VDU. Our micro plinths have slots for maximum ventilation. The single plinth is suitable for a BBC and VDU, whilst the double height version provides enough room for our stacked disc drive and other peripherals like, Eprom programmer, music unit or simply discs & stationary. The computer slides neatly in the lower section allowing easy access to remove the lid.

The single printer stand is equally sturdy but instead of cooling slots it has elegant cutouts on the sides. This allows easy access to paper from all sides. Colour: BBC Beige.

Single BBC Plinth	**£12** (carr. £2)
Double BBc Plinth	**£20** (carr. £3)
Printer Plinth	**£12** (carr. £2)
Single Master Plinth	**£13** (carr £2)
Double Master Plinth	**£24** (carr £3)

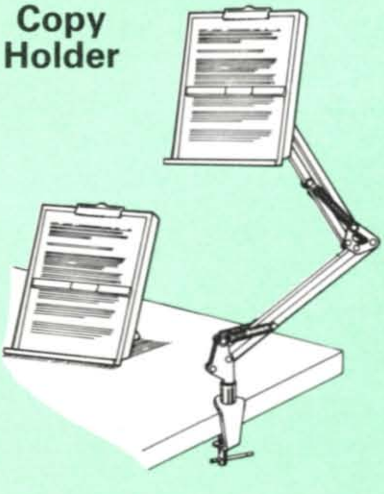
Perspex Printer Stand



Give your Computer System a touch of Class with our elegant, smoke finished Perspex Printer stand. The printer sits on top and the fanfold paper rests neatly underneath, thus occupying the same space as the printer footprint.

Only: £16 (carr. £3)

Copy Holder



Whether you want to type in your latest program or the draft of a new trilogy, Watford's manuscript holders are superb for holding your paper at the ideal height and angle to allow you to read and type in ease and comfort.

Available in 2 full A4 versions, desk resting and shelf clamping. Paper is held firmly by means of a plastic retaining ruler and a clip grip. (for resting books or magazines, the desk top version is recommended).

Desk Top **£10** (carr. £2)
Angle poise **£14** (carr. £3)

MEGABUFFER 256

The Smallest 256K Printer Buffer Unit in the world **38mm x 130mm x 134mm.**

This new Megabuffer 256 from Watford is a full featured 256K Printer Buffer. It allows the computer to print 256,000 character in a short time thus freeing the computer very quickly. In short it makes light work of printing large documents, screen dumps, etc. It is extremely simple to connect. The features are:

- Improves efficiency by making more efficient use of computer and printer.
- Compatible with any computer and printer that uses Centronics Parallel connections including all BBCs, IBM PCs, etc.
- Total compatibility with all software.
- Cheaper phone bills when using your Modems.
- Ideal for those doing large graphics screen dumps that are slow to print.
- Multi-Copy facility allows you to print several copies via Megabuffer without going through your computer.
- Data Dump facility is included.
- Built in test unit for both the buffer & your printer.

In conclusion it can safely be said that MEGABUFFER 256 is the ultimate printer Buffer for both the amateur and professional user.

Only £149 (carr £2)

OKIMATE COLOUR PRINTER

The first ribbon transfer printer in its price range which offers fully versatile colour or black printing. A 24 element print head produces more than 100 shades with exceptional clarity. Ideal for use with Quest Paint or AMX Super Art.

Only: **£119**

BBC Screen Dump	**£10**
Colour Ribbon	**£6**
Black Ribbon	**£6**

THE EPSON RX-FX-KAGA PRINTER COMMANDS REVEALED

So you bought yourself a new printer, because the salesman in the shop showed you how clever it is and impressed you with all sorts of printouts to show its capabilities – he may even have offered you a special price.

However, now that you have got it home and connected it to your BBC microcomputer, you are wondering how to make it perform these magical tasks. The manual seems to give no clues, and when you type in the example programs, the computer throws the LPRINT statements back in your face.

Now what do you do, when this £400 piece of high technology refuses even to move its head, and you have stayed up until 2 in the morning with copious supplies of coffee, desperately trying to print something out. Once again, Watford Electronics comes to your help with our new book entitled 'THE EPSON FX-KAGA PRINTER COMMANDS REVEALED'.

This book describes in plain, easy to understand English, how to use and make the most of your KP810, PW1080A or any other Epson FX80 compatible Printers like Panasonic KX-P1080/1, etc., with the BBC Micro, both from BASIC and Wordwise.

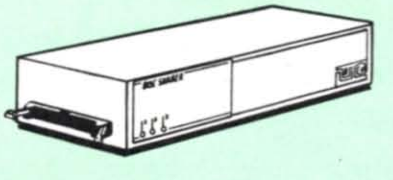
It describes in detail how to obtain the maximum in graphics capability from your printer and includes full indexes allowing you to cross index the numerous commands. Every command is explained in detail, with an accompanying BBC Basic program and an example of its use from Wordwise.

£5.95 (No VAT)

CREDIT CARD 24 HOUR
Ansaphone Hot Lines
(0923) 50234 or 33383

Continued →

DISC DRIVE SHARER



(Ideal for educational establishments)

At last, a low cost alternative to the Econet system. Watford's Intelligent Disc Drive Sharer allows you to connect 3 BBC micros (model B, B+ and Master series) to a single or double disc drive. Running under any DFS or DDFS, this intelligent unit will automatically queue the computers. Each computer has a status light dedicated to it. If it is green you will get immediate access to the disk, and red means that you are next in line. The unit plugs directly into the disc drive socket on each computer and is powered by the mains. (N.B. Not for use with ADFS.)

Launch Price: **£65** Price includes 3 Cables

NOW WITH EXTRA FEATURES AT NO EXTRA COST – Watford's latest DFS 1.44

- Incorporates Acorn's Official Tube Host Code so that those with 2nd processors no longer need to waste a ROM socket on the DNFS.
- Option to DOUBLE the speed of BPUT and BGET.

WATFORD's & ACORN's SINGLE DENSITY DFS

Watford's popular and widely acclaimed DFS has now been available for six years and has gained a large following amongst serious and educational users of the BBC Micro. Owners of Acorn or any other standard DFS can upgrade to our "Ultimate" DFS merely by replacing their DFS ROM. See below for this upgrade. ***(P.S. Watford's highly sophisticated DFS is fully compatible with Acorn standard DFS). (while Acorn's 1770 DFS is fully compatible with Watford's Mk II DDFS)***

- *Complete Disc Interface Kit including DFS ROM and fitting instructions* **£59**
- *Acorn's 0.90 DFS Kit complete* **£59**
- *DFS Manual (Comprehensive)* *(no VAT)* **£6.95**

  (P.S. Our DFS manual is the only comprehensive Manual available for the BBC micro and covers both Acorn & Watford DFSs).
- *Watford's sophisticated DFS ROM only* **£16**
- *We will exchange your existing DFS ROM for Watford's Ultimate DFS ROM for only* **£12**
- *DNFS ROM only* **£17**
- *ADFS ROM only* **£25**

NEW

Watford's MkII 1770 Double Density DFS Interface

Many of our customers have wanted to use our superior DDFS and Acorn ADFS together. Now our Mk II DDFS Board with its 1770 Disc Controller, has been adapted to allow the use of Acorn ADFS as well. It also has all the commands of the Acorn's 1770 DFS, plus the added features:

Added features include:

- Acorn ADFS compatible – Use ADFS on our DDFS board.
- Tube host Code – No longer any need to have the DNFS in your machine to use Co-Processors, even the CoPro and Master 512.
- Auto 40-80 Track sensing – no need to fuss with 40/80 track switches (even works with protected disks).
- An extremely powerful 8271 emulation – ensuring compatibility with almost all software.
- New low profile – small footprint board.
- Fits with all third party ROM boards.
- Option to double the speed of file handling operations – BPUT and BGET.
- Operates in both single and double density modes.
- OSGBPB has been recoded, increasing still further the speed of file handling.

Please note that not all DDFS's are capable of providing either the full 80% storage increase or of allowing a file the full size of the disk – Ours allows both of these!

If you already have a DDFS (any manufacturer), and wish to upgrade to our MkII version, then simply return your existing ROM and DDFS board and we will supply the new DDFS for only **£30.00**.

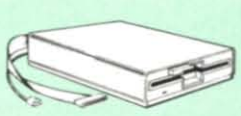
- Special introductory offer **£39.00**
- DDFS Manual (No VAT) **£6.95**
  - We will exchange your existing DFS Kit for our sophisticated DDFS for only **£25.00**

Please note, as the MkII DDFS is a hardware and software upgrade, it is not possible for existing Watford DDFS users to simply exchange their ROM for the new version.

DUST COVERS (For our Disc Drives)

Single CLS (without PSU) **£3.20** Twin CLD (without PSU) **£3.85**
Single CS (with PSU) **£3.95** Twin CD (with PSU) **£3.90**

Special 40/80 Disc Drive/DDFS Mk II Offer



- The popular 40/80 track 400K single Disc Drive, Double Sided, cased with Cables. Plugs directly to your Micro.
- Watford's extremely popular DDFS Disc Interface (allows 720K storage). Will run in both, Single & Double Density modes.
- A comprehensive User Friendly Manual.

A Bargain at Only **£125** (£6 carr)
(Offer valid while stocks last)

3½" DISC DRIVE OFFER

These top quality 3½" Double sided, 80 track, 1 Megabyte (unformatted each Disc Drives), are attractively finished in BBC beige. They are supplied complete with all cables and a Utilities Disc. They run directly from the BBC B/Master's own PSU.

● **CLS35 400K Unit**	**£69**
● **CLD35 800K Unit**	**£126**

Mysteries of Disc Drives & DFS Revealed

Are you tired of faulty cassettes, and lengthy loading times? Do you want to upgrade your BBC micro to take discs but you get tied up in the plethora of jargon surrounding the choice and use of these systems.

Then The Mysteries of Disc Drives and DFS Revealed is the book for you. It explains in detail the different types of systems available, how they are installed and how to use them. Many examples are given including pre-written programs to call various functions of the DFS available only through Operating System calls. Different types of disc, 40/80 tracks etc. are all explained. This book is ideal for the beginner confused by the plethora of choice available in the marketplace.

£5.95 (Book No VAT)

DISC ALBUMS

Attractively finished in black leather look vinyl. Stores upto 20 Discs. Each disc can be seen through the clear view pocket.

£4

FLOPPY HEAD CLEANER KIT

The heads in floppy drives are precision made and very sensitive to dirt. The use of a cleaner Kit is a sensible precaution against losing valuable data. It is recommended to clean the drive head once a week. It is very simple to use. Available in 3½" & 5¼", please specify.

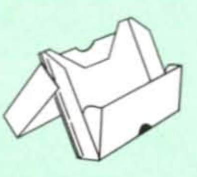
£4

ANTISTATIC LOCKABLE DISC STORAGE UNITS

Gives double protection – Strong plastic case that affords real protection to your discs. Antistatic helps avoid data corruption whilst in storage. The smoked top locks down. Dividers and adhesive title strips are supplied for efficient filing of discs.

● **M35** - holds upto 50 5¼" discs	**£5.00**
● **M85** – holds upto 95 5¼" discs	**£8.00**
● **M25*** – holds upto 25 3 ½" Discs	**£5.50**
● **M50** – holds 50 3½" Discs	**£7.50**
● **M10** – holds upto 10 Data Cartridges	**£15**

* Not lockable



PLASTIC LIBRARY CASES

Holds up to 10 5¼" Discs. **Only £2.00**

DISC PLONKER RACK

When using ones micro, there is a tendancy to have more than one Disc on the desk. This exposes them to the hazards of fingerprints, scratches, dust, coffee and an untidy desk.

Why not protect your valuable data from all these hazards with the help of our extremely handy and low cost DISC PLONKER RACK. It holds up to eight 5¼" Discs.

Protection at Only: **£2**

Quality Disc Drives from Watford

To help you decide which drive is the most suitable for your needs (and your pocket!), we have produced the table below.

The first capacity given in the first column indicates capacity in single density mode. That within the brackets is the capacity in double density mode. All disc drive type numbers start with the prefix "C".

The tinting on some of the boxes is used to indicate which Drives are 40 track (non-tinted) and which are 80 track (tinted). All our 80 track drives are already fitted with a 40-80 select switch.

All our Disc Drives are Double Sided and will operate in both Single and Double Density modes. *Extensive experience of the usage of disc drives suggests that the JAPANESE drives currently represent about the best in terms of speed, reliability and overall "elegance" available for the BBC Micro.*

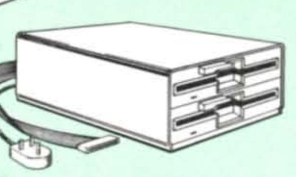
Various UK "manufacturers" of disc drives for the BBC micro (more accurately, "packages" label other manufacturers drives with their own name). We buy the high quality NEC and Mitsubishi drives in large quantities directly from the manufacturers, package them and sell them at "dealer" prices direct to the public.

If you look around the popular BBC micro press, you will find that the prices we quote for the top quality, new slimline disc drives are, virtually without exception, some of the best around. These prices, coupled with the backup of one of the country's largest distributors of BBC peripherals provides a superb deal.

Unless you anticipate using dual drives in a fully expanded BBC system for long periods of time with little ventilation, then we suggest that our range of "CL" disc drives without the PSU (Power Supply Unit) would be quite adequate (extensive tests within our workshops have confirmed this). All drives are supplied complete with a SPECIAL UTILITIES Disc, Cables and Plugs. The Drives with power supply have a mains moulded plug for safety purposes. Ideal for Schools & Colleges. We are now able to supply all single disc drives with Power Supply, in either single or dual case. (Dual case has a twin data cable and a power supply capable of driving two disc drives) allows easy expansion to a dual drive unit, at a later date. Prices stated in the pricing boxes below are for single drives in standard single cases. Single drives in a dual case cost an extra £5. (At Watford we anticipate your needs of tomorrow, not just today)!

When using a BBC Micro, most people find themselves short of desk space. The Watford's BBC Micro plinths form an ideal way of recovering some of this precious space) your BBC, Disc Drive and Monitor can all occupy the same vertical footprint and still be comfortably situated. With the Watford Double plinth, your Disc Drive is mounted vertically at one side, leaving a very valuable area directly in front of you for such useful items as spare discs, pen, paper, reference manuals, etc. Follow the trend with Watford plinth. (Turn to the 5th page of our advert for the Plinths).
P.S. All our 5¼" Disc Drives with PSU are compatible with the Compact Micro. All you require is the special Compact Disc Drive Cables designed by us.

Our Disc Drives conform to BS415



"Test Bureau Approved for Use in Education"

Capacity	Drives without P.S.U.		Drives with P.S.U.	
	Single	Twin	Single	Twin
400K (720K)	CLS400S £82	CLD 400 £168	CS 400S £92	CD400 £188
800K (1.44M)		CLD 800S £162		CD 800S £182

- TWIN Disc Drive Case, complete with Power Supply & Cables **£43**

Securicor carriage on Disc Drives £5 to £6

*Prefix **C** = Cased Drive*
***L** = Less PSU*
***S** = Single*
***D** = Double*

*Suffix **S** = 40-80 Switchable*

e.g. CLS400S = Cased Disc Drive, Less power supply unit, single 5¼" 400K, (720K in double density); Double sided; 40/80 track switchable.

Cable to connect 5¼" Disc Drives to BBC Compact
Single £9 Twin £12
Special Cable to connect both 3½" and 5¼" Disc Drives simultaneously to the BBC Compact £13

3M – DISKETTES

3M – SCOTCH Diskettes with Lifetime warranty from Watford Electronics your 3M Appointed Distributor.

● *10 × 5¼" S/S D/D 40 Track Diskettes (744)*	***£6.00***
● *10 × 5¼" D/S D/D 40 Track Diskettes (745)*	***£7.00***
● *10 × 5¼" S/S D/D 80 Track Diskettes (746)*	***£11.50***
● *10 × 5¼" D/S D/D 80 Track Diskettes (747)*	***£11.00***
● *10 × 5¼" 1.6M D/S D/D High Density Discs for IBM XT and AT*	***£16***
● *10 × 3½" S/S D/D 40/80 track Discs*	***£10.00***
● *10 × 3½" D/S D/D 40/80 track Discs*	***£11.75***
● *10 × 3½" High Density Diskettes*	***£25***

TOP QUALITY 3½" & 5¼" DISKETTES

To complement our range of Quality Discs and Disc Drives, WE are now supplying SPECIAL OFFER packs of 10 Lifetime guaranteed discs. Each disc has a reinforced hub ring. Supplied complete with selfstick labels and a Plastic Library Disc Box.

● *10 × **M3** 3½" D/S D/D 80 Track Discs*	***£11***
● *10 × **M9** 3½" Double Side High Density*	***£25***
● *10 × **M4** 5¼" S/S D/D 40 Track Discs*	***£5***
● *10 × **M5** 5¼" D/S D/D 40 Track Discs*	***£7***
● *10 × **M7** 5¼" D/S D/D 80 Track Discs*	***£9***
● **10 × M8 5¼" D/S H/D Hi-Density Discs**	**£14**
● *3" Double Sided Discs*	***£2.50** each*

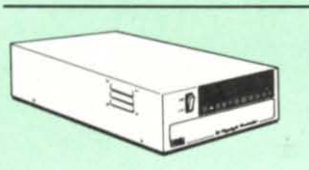
Special BULK OFFER on 5¼" DISCS

PRICES SLASHED

(Supplied packed in Anti-Static Lockable Storage Units)
(Lifetime warranty on Discs)

BULK PACK DISCS in lots of 100

Type	S-S 40T	D-S 40T	D-S 80T
● Without Sleeves	£35	£39	£45
● With Sleeves	£38	£42	£48



WATFORD's WINCHESTER DRIVES

Undoubtedly the best value for money Winchester Hard disc available anywhere for the BBC Micro.

This 30 Megabyte hard disc is completely compatible with the Acorn ADFS – that's why we have bundled it with each Winchester drive, along with a Utilities Disc.

Finished in rugged metal and fetching BBC beige, the Winchester has an internal fan, so quiet you won't even hear it! A switched mode power supply and a neon-lit on/off switch are there along with a light on the hard disc to tell you when it is working – just compare the price with our competitors' 20 or 28 Mbyte discs!

Compatible with the Master, and the BBc B (with 17 X disc interface).

- 10 Megabyte **£350;** ● 30 Megabyte **£420**

CDP800S CDPM800S

Twin 800K Double sided 40-80 track switchable disc drives mounted in an attractively finished Beige colour plinth for the BBC Micro. Supplied complete with integral power supply, cables and Utilities disc. The mains switch with neon On/Off light indicator, and the two 40/80 track switches are mounted on the front panel for ease of use.

CDP 800S for BBC Micro £192
CDPM 800S for Master £196
DP35-800 for BBC/Master £165
(For DP35-800S spec. see Page 9 of our advert)

(Securicor Carr. £7)

(The above drive units are 2 Megabytes unformatted)

Continued →

QUEST MOUSE Mk II

QUEST MOUSE MkII

The ultimate in Mouse technology, the Watford Electronics Quest Mouse must be the most powerful Mouse package yet produced for the BBC Micro. Featuring state of the art 32K ROM software the Quest Mouse package is filled with features essential to the budding artist. The Quest Mouse is a high precision, low profile and large footprint mouse. It has three large comfortable buttons and its RUBBER COATED STEEL BALL is smooth and easy to use on virtually any work surface. This also eliminates any directional bias that one encounters on the most well-known mouse for the BBC. The Quest Mouse is FULLY HARDWARE COMPATIBLE with the AMX MOUSE so that it will work with any of the AMX range of software.

The two parts of the Quest package are available separately so that existing Mouse owners can upgrade to the Watford's sophisticated Quest Paint software or replace their existing worn out mice for a minimum cost.

QUEST PAINT

The Quest Mouse software is supplied on a PALPROM unit to allow the sophisticated 32K program to be used from a single ROM socket. It is compatible with the BBC B, BBC B Plus and BBC Master Series machines.

The software is used to draw high resolution Mode 1 pictures in full colour. All menu selection and control of the drawing process is performed with the mouse so that you will hardly ever touch the keyboard.

SOFTWARE FEATURES

The software is far too powerful for us to describe it fully in such a small space. Below is a list of the various features. Please write to us for a fully descriptive leaflet.

Disk interface not required. Utilities disk has facility to create and print big screens. Colours applied can be solid, either pattern of user defined pattern. Drawing can use brush or airbrush. Brush shapes can be defined and stored. Airbrush sprays colour/pattern randomly with four jet sizes and even or center spread. Colour cycles. Colour protection to stop particular colours from being overwritten by selected drawing actions. All standard drawing facilities like: rubber, straight pencil lines, triangles, circles, ellipses, rectangles, parallelograms, polygons, etc are provided. All shapes can be solid or just a boundary line. Once a shape has been set up it can be repeated anywhere on the screen. Global colour replace in a rectangle. Powerful fill facility for areas and vertical/horizontal lines. Full cut and paste of rectangular areas with rotation and size with screens from Watford Beeb Video digitiser. Load and Save screens with colour pallet information, save brush and pattern definitions etc.

Take The Guesswork Out of Selecting a Mouse Package

With reviews like this how can you go wrong.

Popular Computing Weekly, 9-11 June '87

"What you actually get for your money is a well built, three button mouse (far superior to the AMX mouse)."

"Overall the combination of a quality mouse and decent art package gives Watford Electronics a real chance of supplanting AMX as mouse supremos."

Micro User June '87

"Quest Mouse and Quest Paint can hold their heads high in the market..."

A&B Computing June '87

"... Watford Electronics, a company famed for excellent hardware add ons and versatile software packages. Called Quest mouse, "this is a very special mouse driven drawing package..."

FREE

our popular Colour Art software pack worth £15 with every Quest Mouse II & Quest Paint purchased this month.

"... you will have one of the most comfortable and professionally built mice I have used in a long time. The buttons are responsive, the mouse movement is smooth and without directional bias – a pleasure to use."

"What we have here is probably the best art package there is for the BBC Micro ..."

"Quest Paint is a major leap forward in BBC programming..."

"Quest Paint is an original piece of programming, it is friendly and well endowed with many useful facilities. I would comfortably say it is easier to draw good pictures with Quest Paint than it is with more expensive 'Professional' art packages for the Atari ST and the Commodore Amiga. A recommended buy if you are looking for the best in BBC micro based art packages".

Acorn User, September '87

"The mouse (Quest) performs well in the face of competition from AMX, Wigmore and the rest ..."

"... this package represents excellent value for money. If you are interested in art then this program is for you to buy".

"Given time, I can see no reason why Quest Paint shouldn't take on the title of the definitive art package available for the BBC Micro to date".

"All in all, Quest Paint is a very professional package. It contains virtually every feature the budding artist could require".

"What makes Quest Paint so versatile is the addition of a sub-menu which allows you extensive control over each function".

"Until recently, Superart from AMS had been judged as the definitive mode 1 graphics package for the BBC micro. But now it has a serious rival in the form of Quest Paint, from Watford".

"As a measure of what is contained within Quest Paint, I would say it had all the features of Superart plus ..."

"In most art packages, provision is given for drawing triangles and rectangles. Quest Mouse goes 14 better, allowing any regular polygon of upto 16 sides".

"One facility, not found on any other Art package to my knowledge, is the ability to access a digitiser from within the program". The reviewer concludes by saying, "The result is an extremely comprehensive and professional art package".

John Kilby, Head of Computer Science, Bishop Wulstan High School, Rugby, writes:

"Quest has been an excellent piece of equipment. The problem that seems to occur everyday is that at lunchtime the pupils rush to the computer room to make sure that they are first in the queue for the 'Quest' mouse".

Lt. Col. C.G. Holton, HQ 1 (BR) Corps, BFPO 39, writes:

"As ever your service is superb and the Quest Mouse proves every bit as good as the adverts claim".

Beeblet User Group, New Zealand Oct '87:

"One of its nicer features is that the top menu is done in Mode 0, the drawing itself is in Mode 1. Thus on screen together are two different Modes. A neat way around an old problem".

"PAN is used when a larger than one screen size image is required. The mind boggles at an A3 size drawing".

"I like it partly because of the mouse itself which is smooth and easy to handle but mainly I suppose because of the features I longed for and previously never got. Its easy to use with almost everything at your fingertips from the mouse. The software is simple where needed and complex where complexity is required".

ConQuest

Watford's Quest package is an extremely powerful and flexible drawing package, with very wide and unusual features. However, since its launch various suggestions for even more advanced & powerful facilities were received from the Quest users. ConQuest allows you these more advanced facilities, like, distortion of a cutout to any shape and a full font designer. If you also have a GXR ROM in your machine or you are using a BBC Master then ConQuest will take advantage of this to give ellipses at any angle, sectors and arcs, etc. Quest combined with ConQuest and Acornsoft GXR ROM make up THE MOST POWERFUL drawing packages available for the BBC range. Quest Paint is able to take advantage of almost any additions to your machine, such as Shadow or Sideways RAM. ConQuest takes this principal even further, by utilising the otherwise normally incompatible Sideways RAM facility by holding pictures in them.

Some of the features are:

- *Pick filenames off the screen for loading and saving.*
- *Rotate a cutout to any angle and Distort it to any four sided shape.*
- *Has Built in Font editor.*
- *Default brushes and patterns on startup.*
- *16 x 16 font available on start up.*
- *Ability to reset patterns, fonts and brushes to default at any time.*
- *ROM based enhanced Epson and compatible printer dump.*
- *ROM based enhanced extended picture routine.*
- *Ability to create and abort extended pictures*
- *Improved disk access speed for extended pictures.*
- *User definable sideways RAM driver for incompatible sideways RAM systems.*
- *Ellipses at any angle on Master 128 (or B with GXR ROM).*

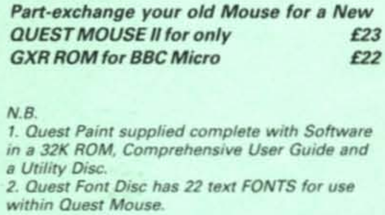
QUEST MOUSE II & QUEST PAINT	***£49***
QUEST MOUSE II, QUEST PAINT, AMX STOP PRESS & PAGEFONT	***£82***
QUEST MOUSE II ONLY	***£25***
QUEST PAINT SOFTWARE	***£32***
QUEST FONT DISC	***£12***
ConQuest 32K ROM Package	***£29***
QUEST MAT	***£3***
Part-exchange your old Mouse for a New QUEST MOUSE II for only	***£23***
GXR ROM for BBC Micro	***£22***

N.B.

1. Quest Paint supplied complete with Software in a 32K ROM, Comprehensive User Guide and a Utility Disc.

2. Quest Font Disc has 22 text FONTS for use within Quest Mouse.

MARK II LIGHT PEN



Our Mark II Light Pen is the very latest in light pen technology. It is totally insensitive to local lighting conditions and works with many different monitors. The pen only responds to the High Frequency light produced by your monitor/TV. An LED indicates when valid video data is being produced. A conveniently located switch is also fitted.

Price Only £21

(Price includes FREE software Disc and Operating Manual)

RB2 Marconi TRACKER BALL

RB2 (AMX/Quest compatible)	£45
RB2 including Quest Paint	£75

FLEET STREET EDITOR

Software pack for BBC Micro	£33
Software pack for the Master	£39
Software Pack for Compact	£40
Admin Xtra Disc Utility	£13
Walt Disney Disc Utility	£13
Fonts N Graphics Disc Utility	£13

THE NEW Mk III AMX MOUSE

ONLY: £59 **Inc. Super Art package**
(carr £1.50)
(Please specify for BBC, Master or Compact)

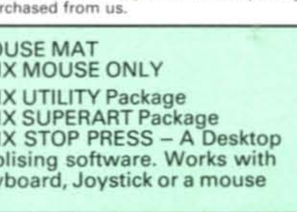
FREE our popular Colour Art software pack worth £15 with every AMX Mouse package purchased from us.

MOUSE MAT	£3
AMX MOUSE ONLY	£29
AMX UTILITY Package	£11
AMX SUPERART Package	£34
AMX STOP PRESS – A Desktop publishing software. Works with Keyboard, Joystick or a mouse	£32

We are giving away absolutely FREE, our PAGE-FONT disc with every purchase of STOP PRESS from us.

PAGE-FONTS – Over 20 Fonts for use with AMX Pagemaker	£12
AMX DESIGN (ROM)	£55
AMX XAM Educational	£15
AMX EXTRA EXTRA	£16
AMX MAX A gem of desktop (ROM)	£15

DIAGNOSTICS DISC



The BBC Micro is a very complex machine and thus diagnosing a fault can be very difficult. At Watford Electronics, we realise how difficult it can be when faced with a problem, finding yourself a long way from your nearest dealer, or even just uncertain about your Beeb's health, but not wanting to waste time and money taking it to be looked at.

The solution to these problems is here now, in the form of the Watford's Diagnostics Disc. This excellent utility is specially designed to test out the following areas of your Beeb:
RAMs, ROMs, ULAs, Sound, Keyboard, Disc, RS423, ADC, User Port, Printer Port, Cassette, Joysticks, Speech, Disc Drives, 6502 and Z80 2nd Processors.

This utility is an invaluable aid for all those who take the reliability of their system seriously. A comprehensive manual provides full operating details and a list of possible causes and remedies for any faults that you may find along the way. The package also enables a permanent equipment and service record to be maintained.

Only £20.00

BEEB VIDEO DIGITISER

"Test Bureau Approved for Use in Education"

Using any source of composite video (colour or monochrome) and the Watford Beeb Video Digitiser, you can convert an image from your camera into a graphics screen on the BBC Micro.

This uses the full graphics capacity of the BBC micro in modes 0, 1 or 2. The video source may be a camera, video recorder or television, and is connected via the video output socket.

Images produced can be compressed, stored to disc, printed on an Epson compatible printer, directly used to generate graphics, analysed for scientific and educational use or converted to other formats e.g. Slow Scan TV or receiving a picture from a remote camera using a modem.

The output from the digitiser exactly matches the graphics capability in each mode, with up to 8 levels of grey in mode 2. The unit connects into the User Port and automatically scans a complete picture in 1.6 seconds.

Both the black and white levels can be adjusted manually for the optimum picture, or switched to automatic for unattended use. The image produced can be reversed if necessary.

Full controlling software is supplied on a normal sideways ROM and this is easily accessed via additional * commands. The package i designed to allow easy input of complex screens and give full access of the data to the user. Once on the screen, the image can be used as a normal graphics screen, allowing any of the usual graphics commands in BASIC or other ROMs to work on it.

A special print dump routine is included with the driver programs. This is specially designed to produce a fast, correctly proportioned picture, with reduced "contouring", resulting in an accurate reproduction of the original image.

Detailed examples of driving this unit from BASIC or other languages are all provided in the extensive manual supplied.

£109 (Carr. £3)

(Price includes) Digitiser Unit, Software in ROM & a Comprehensive Manual)
(BBC B+ and Master compatible, except Master with Econet)

Magazine Maker

(As seen on TV)

A combination of the Pagemaker and Watford's Beeb Video Digitiser.

Using any video that provides a composite signal and the digitiser, images from a camera or TV can be converted into a graphics screen on the BBC Micro.

They can then be used within Stop Press to illustrate magazines or newsletters – in fact anything that needs to be created on A4 size paper.

With Stop Press's many features, a variety of pictures can be composed – the only limit being the imagination.

Pictures can be doctored using Stop Press's graphics option to produce any number of effects.

Text can be formatted around the digitised photo on screen using the facilities available, which include 16 typefaces, character and pattern definer, text formatting and the ability to load in wordwise and viewfiles plus much more.

Once created the picture can be printed out. The Magazine Maker is suitable for any use that requires illustrated documents.

Complete Package **£135.00** (carr. £3)

OFFICE MASTER

CASHBOOK – A complete "Stand Alone" accounting software package for the cash based sole trader/partnership business. It is designed to replace your existing cashbook system and will provide you with a computerised system complete to trail balance.

FINAL ACCOUNTS – Will take data prepared by the Cashbook module and produce a complete set of accounts as following: Trial Balance with inbuilt rounding routine; Notes to the accounts; VAT Summary; Profit & Loss A/C; Balance Sheet.

MAILIST – A very versatile program. Enables you to keep records of names and addresses and then print, examine, sort and find them, all with special selection techniques.

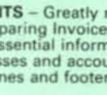
EASILEDGER – A management aid software tool designed to run alongside an existing accounting system. Essentially a Debit/Credit ledger system which can handle sales, purchase and nominal ledger routines to provide instant management information.

INVOICES & STATEMENTS – Greatly reduces the time and cost of preparing Invoices and Statements by storing essential information like customer names, addresses and account numbers. Has VAT routines and footer messages facility.

STOCK CONTROL – Allows you to enter stock received, stock out, summary of stock items and current holdings together with details of total cost, total stock to minimum level, units in stock ordering, quantity and supplier detail.

All this for only **£21** (Disc)

OFFICE MATE



- ● DATABASE
- ● BEEBCALC SPREADSHEET
- ● BEEBPLOT GRAPHICS

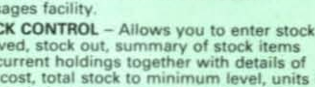
DATABASE – Set up a computerised card index system with powerful search facilities.

SPREADSHEET – Offers many calculation and editing features.

BEEBPLOT – Provides visual representation from Spreadsheet data.

OFFICE MATE Only £10 (Disc)

Disc Drives DP35-800S



A Double disc drive – with a difference! Times are changing fast for the floppy disk, and whilst the current standard for the BBC B and Master Series is the 5.25 inch disk, the standard for the future will most certainly be the smaller; faster and more reliable 3.5 inch disks – now a standard feature of both the Master Compact and the Archimedes Series.

To support the present disc drive users, and cope with the future, we have designed our own plinth-mounted disk system – called the DP35 800S, it contains both the 5.25 inch and the 3.5 inch drive formats as well as offer a firm and rigid support for a monitor on top. With the BBC Micro underneath, the plinth makes a surprisingly small footprint on the desk – leaving you more space to work with.

The 5.25" disc drive is 40/80 track switchable. For ease of access, the switches are front mounted. DP35-800S has its own power supply, independent of the BBC Micro.

Watford's new plinth enables users to read, write and format disks both in DFS and ADFS format – currently the accepted standard for the Master Compact and the Archimedes, it also enables the user to read disks written for the Archimedes. Ideal for both BBC & Master.

Launch Offer: **£165** (carr. £7)

Continued →

ARIES CORNER

B-32 Shadow RAM Card

Like the BBC B+, the B32 provides 20k of shadow screen RAM and 12k of sideways RAM. Unlike the B+, the B32 has simple software commands which allow the user to reconfigure the RAM as 16k of shadow RAM and 16k of sideways RAM, or all 32k as sideways RAM.

With the B32, the programmer gets up to 28k of RAM available for Basic, Logo, Comal, Forth, Lisp and BCPL programs in any screen mode. The business user gets extra memory for View, ViewSheet, Wordwise Plus, Interword and many other applications. For advanced applications, the scientific user gets access to a massive 47k of data storage using the Acorn approved *FX call.

Sideways RAM enables you to load sideways ROM images from disc, allowing you to have a large library of sideways ROMs (subject to the copyright holder's permission) stored on disc. The B32's sideways RAM can also be used to extend any operating system buffer (such as the printer buffer) or to load tape programs into a disc system.

The B32 simply plugs into the 6502 processor socket on your BBC micro – no flying leads to connect and no soldering. Provision of the on-board ROM socket means that the Aries-B32 control ROM does not use up one of your existing ROM sockets.

- Recommended by Computer Concepts for use with their Inter series of ROMs.

Price: **£80** (carr. £2)

Aries B-12 Sideways ROM Board

This board is extremely well made, simple to install, reliable when fully loaded and compatible with the Aries-B20 and the Aries-B32

The B12 provides a total of twelve sideways ROM sockets (the four in the original machine are replaced by the twelve on the board), all fully accessible by the MOS sideways ROM system. In addition, there are two sockets for sideways RAM, giving up to 16k of RAM using 6264 static RAM chips.

The B12 system consists of two parts: a large detachable "mother board" which carries the extension ROM sockets and a small "base board" on a short ribbon cable, which plugs into the existing sideways ROM sockets. This two-board design eliminates the reliability problems previously associated with some other ribbon-cable based systems.

If you do not have a B32 or B20, a small adaptor module (the Aries-B12C) is available at a nominal cost.

Price:		
Price:	Aries B-12	**£40**
	Aries B-12C	**£5**

CREDIT CARD 24 HOUR
Ansaphone Hot Lines
(0923) 50234 or 33383

ARIES B-488 IEEE-488 INTERFACE UNIT

The Aries-B488 is an interface unit to enable the BBC micro to control and monitor IEEE-488 bus systems. The IEEE-488 bus (also known as the 'GPIB' or 'HP-IB') is the standard method of interconnecting programmable laboratory instruments and control equipment. Using the B488, up to 15 devices may be connected in a single high-speed data network.

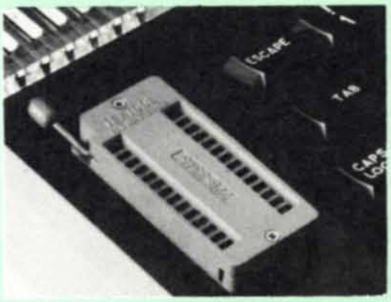
£238 (Carr £3)

EXTERNAL ROM BOARD for BBC MASTER

This external Beige finished, free standing cased unit with its own Power Supply allows you to plug-in upto 12 ROMs and 16K Sideways RAM.

Only £78

SIDEWAYS ZIF SOCKET



Allows you to change your ROMs quickly and efficiently, without opening the lid. The ZERO INSERTION FORCE (ZIF) socket is located into the ROM Cartridge's position.

- Very simple to install. NO SOLDERING required. The ZIF (Zero Insertion Force) eliminates the possibility of damage to your ROM pins when inserting & extracting.
- The low profile of the socket allows unrestricted access to the Keyboard.
- All data and address lines are correctly terminated to ensure correct operation of suitable ROMs with the BBC micro. We also supply a purpose designed see-through storage container with anti-static lining, allowing you to store up to 12 ROMs, protecting them from mechanical and static damage.
- This versatile hardware solves the problem of running out of socket space. Simply lift the ROM from the ZIF & insert a different one (No pulling or pushing of Cartridges. It is a must for all professionals and Hobbyists alike.)
- BBC, B+ and Master compatible.

ONLY **£16** (carr £2)

Low Profile CARTRIDGE SYSTEM

Complete System consists of: Low profile ROM Cartridge, Socket housing, Cable assembly, 5 labels and a library storage rack for the BBC B.

● Complete System	**£11**
● Spare Cartridges	**£2.50**
● Spare Rack	**£1.50**

ROM Cartridges for the BBC Master
Twin **£8;** Quad **£12**

16K DISC RAM

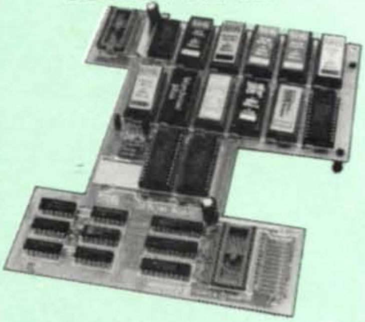
Complete with such features as read and write protection, these new modules from Watford Electronics are ideal for the hobbyist, software developer and ROM collector.
Key points to note about this new addition to the Watford range of products are:

- Write protection (useful in a variety of circumstances).
- Read protection (allows recovery from ROM crashes).
- Compact construction.
- Supplied complete with Battery Backup.
- Multiple units may be fitted, even with a ROM board.
- No overheating or overloading problems.
- Free utilities disc supplied.
- Can be used as a 16K PRINTER BUFFER.
- Ideal for professional software development.
- Supplied with utilities software disc.

Only: **£35** (carr £2)

P.S. 16K Disc Ram Board is not designed to work in conjunction with a Sideways ROM Board.

SOLDERLESS SIDEWAYS ROM SOCKET BOARD



In the May 1986 Micro User's independent review, the writer concludes, "The board has been well laid out. Its position is much better than others – not over the HOT RAM chips and further away from the disc controller area". "I give the solderless ROM board the thumbs up and wish it success".

This brand new board from Watford Electronics is designed specifically for those wishing to add a ROM board to their own BBC without the need to perform any soldering.

This new board expands the total possible number of ROMs in a BBC from 4 to 16.

Unlike our competitors inferior boards, the ONLY upgrade required for fitting battery backup to the Watford Solderless ROM board (all Watford ROM boards, actually) is the fitting of the battery itself. (No other expensive components are required.)

- The key features of this new, no fuss, easy to install quality product from BBC leaders Watford Electronics are as follows:
- Increase your BBCs capacity for ROMs from 4 to 16.
- **No soldering required.**
- Very low power consumption.
- Minimal space required.
- Compatible with Torch, DDFS, RAM Card, 2nd Processor, etc.
- Socket 14 takes two 6264 RAM chips.
- Read protect to make RAM "Vanish") allows recovery from ROM crashes.
- Battery backup option for RAM chips.
- Supplied ready to fit with comprehensive instructions.

Price: Only £32
Battery backup fitted **£36**
Battery Backup only **£3**
(carriage £2)

- Sideways RAM Utilities Disc for Solderless ROM Board. Includes the options to load and save ROM Images and the facility to use Sideways RAM as Printer Buffer.

Only: £8

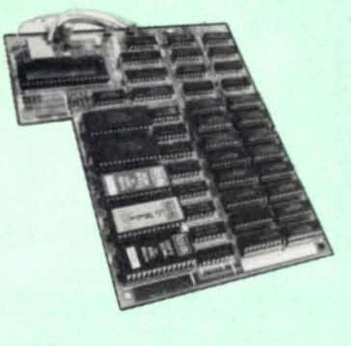
USER PORT SPLITTER UNIT

User Port Splitter
A
B

Gone are the days when you had to plug and unplug devices from the User Port. This extremely useful little device allows two units to be connected to the User Port simultaniously, and select between them simply by toggling a switch. This device is particularly useful for those people using Quest Mouse and the Watford Video Digitiser or any similar combination.

Excellent Value at **£22** (carr £2)

ROM/RAM CARD



Watford Electronics announced the first ever commercial ROM board for the BBC micro, the Watford Electronics 13 ROM Socket Board 3 years ago. Following the success of this board, we have designed what probably represents the ultimate in expansion boards, the new Watford Electronics ROM/RAM board. This highly versatile and sophisticated board represents the latest in "2nd generation" sideways ROM technology for the BBC micro, designed to satisfy the serious BBC user.

- NO SOLDERING required to fit the board.
- NO overheating problems.
- No User Port corruption (avoids problems with the mouse, modems, Eprom Programmers, etc.)
- Fully buffered for peace of mind.
- Firm mounting in BBC micro.
- Compatible with all BBC micros (not BBC+ or Master).
- Total number of ROMs increased from 4 to 8.
- Up to 8 banks of sideways RAM (dynamic).
- Option for 16k of Battery backed CMOS RAM (CMOS RAM needs one ROM socket).
- Software Write protect for ALL RAM.
- Read protect for CMOS RAM (ALLEVIATES crashes during ROM development).
- Separate RAM write register (&FF30 to &FF3F).
- Automatic write to currently selected RAM socket for convenience.
- Accepts any ROM.
- FREE utilities disc packed with software.
- Compatible with our DDFS board, 32k RAM Card, Delta Card, sideways ZIF, etc.
- Large printer buffer.
- UNIQUE Fully implemented RAM FILING SYSTEM (similar to the popular Watford DFS).
- ROM to RAM load and save facilities.

The SFS (Silicon Filing System) can utilise up to the full 128k of RAM (with the SFS in any paged RAM) as a SILICON DISC. This behaves as a disc drive, with all the normal Watford DFS features (including OSWORD &7F for ROM-SPELL, etc.) to provide an environment that looks like a disc but loads and saves MUCH faster.

The ROM-RAM Board plugs into the 6502 CPU socket. This leaves free all the existing ROM sockets, which can still be used normally.

Any ROM that can be plugged into the BBC micro's own ROM sockets may be used in the ROM-RAM Board.

The ROM-RAM Board is supplied with all ordered options fitted as standard. Upgrade kits (with full instructions) are available for all of the options, for later.

Please write in for further details.

INTRODUCTORY PRICES:

● ROM/RAM card with 32k dynamic RAM	***£48***
● ROM/RAM card with 64k dynamic RAM	***£65***
● ROM/RAM card with a massive 128k dynamic RAM	**£109**

(carriage on ROM-RAM Card £3)

OPTIONAL EXTRAS:

● 16k plug-in Static RAM kit	**£17**
● 16k Dynamic RAM for Upgrade	**£17.50**
● Battery backup	**£3**
● Read and Write protect switches	**£2** each
Complete ROM-RAM board All options installed	**£115**

P.S.

Is your existing ROM Board overflowing with ROMs? Do you need more Sideways RAM? Is your Board unreliable? Then upgrade to Watford ROM/RAM Board and pay £5 less

Le Modem

The MODEM from Watford

At last a professional MODEM for the BBC Micro. Unlike other 'Modem packages' this is a complete package there are no extra software costs to get 'up and running'. Of course Le MODEM is multi-standard, i.e. 300/300, 1200/75 & 75/1200 UK and BELL (USA) are all supported.

The features that make Le MODEM such good value are:

- *A complete communications terminal that transforms your BBC Micro into a very powerful World-wide data transfer system.*
- *Auto Dials, Auto answers, and is completely controlled by your micro. There are no external controls!*
- *Allows you to access PRESTEL, B.T. GOLD, THE SOURCE, MICROLINK, MICRONET, MICROWEB, THE TIMES NETWORK, MICRO LIVE (BBC TV database), CITY BB and more.*
- *Designed to be SIMPLE but SOPHISTICATED. To LOGON to a data base all you have to know is its TELEPHONE NUMBER, Le MODEM does the rest.*
- *Supplied with a comprehensive telecomms package in a 16K sideways ROM which includes a FULL PRESTEL terminal allowing TELE-SOFTWARE to be downloaded.*
- *A comprehensive 80 column terminal. This includes XMODEM error checked transfer protocol, to allow error free data transfer anywhere in the world!*
- *FULLY controlled by simple '*COMMANDS allowing you to control it from your own BASIC programs. To get you started we supply a FREE disc of bundled software!*
- *Connects to the 1MHz bus. A *AUDIO ON-OFF command allows you to actually hear the telephone line through your BBC micro loudspeaker.*
- *Completely self contained with internal mains power supply. (Even a free mains plug is fitted!) A *TEST facility gives ON SCREEN indication that Le MODEM is working correctly.*
- *Packaged in such as way that you need nothing else except a BBC Micro to communicate with computers all over the world.*
- ***FREE Registration to MicroLink.***

SPECIAL OFFER

Price: ***£75***
(carr £3)

(Price includes, Le Modem, Software ROM, Cables & Comprehensive Manual)
(Write in for further details)

REPLICA 3

This new improved REPLICA 3 from Clares is a very powerful disc based TAPE to DISC Utility. It now transfers even more programs than ever before. Replica 3 will not work with all programs but then neither will anything else. 30,000 Replicas have been sold to date. It has to be good.

£15 (40 or 80 track)

Acorn's Speech Synthesiser package, complete
Special Offer £18

APOLLO

The NEW Modem from Watford

Following numerous requests from you, our discerning customers for an APPROVED, Low Cost & High Performance modem with Auto Dial & Auto Answer facilities as standard) we bring you the versatile APOLLO Modem. Just compare the features and look at the price (which incidentally includes the cost of the Software, manual and BBC connecting cable). We are sure you will agree that Watford Electronics in their traditional way are giving you a super 'value for money' deal.

Just look at these features:

- V21 for Bulletin boards, Microlink, Telecom Gold, etc.
- V23 for Prestel, Home Banking, and other Viewdata services.
- Reverse V23 allows User run Viewdata service.
- 1200-1200 half duplex for communications.
- XMODEM, HEX and ASCII file transmission.
- Auto Dial of given 'phone number.
- Auto Answer for User's Bulletin Board.
- 80 column terminal with split screen facility.
- Prestel text screen dump.
- Fully BABT approved.
- **FREE Registration to MicroLink.**

The Apollo is attractively finished in matt black. It opens the doors to world communication to both, the Hobbyist and the Professionals alike. With baud rates varying from 300/300 Originate and Answer, 1200/75 and 75/1200 full duplex and 1200/1200 half duplex, virtually all the popular tele-services can be accessed. A comprehensive Comms ROM oversees the use of the APOLLO, providing simple commands for all the software controlled facilities. APOLLO is an ideal modem for both the first time buyer and the seasoned user. Join the Telecommunications Revolution – Buy a Watford APOLLO!

Only: **£82** **(Carr £3)**

Price includes, the Modem, Comm Software Cables & Operating Manual).
(Write in for full specification)

VOLTMACE JOYSTICKS

Delta 3B Single Joystick	£10
Delta 3B Twin Joysticks	£15
Delta 3C Joystick for Compact	£10
Delta 14B Single Joystick	£11
Delta 14B/1 Adaptor Module	£12
Transfer Software Disc-Tape	£7

ATTACHE CARRYING CASE

For the BBC Micro. Attractively finished in antique brown leatherette. Lockable.
Only **£10** (£2 carr.)

Versatile **BEEB SPEECH SYNTHESISER** Unit

Beeb Speech Synthesiser

The Watford Speech Synthesiser is a very flexible speech synthesis unit based upon the powerful phonemes system. This system stores the building blocks of speech (called phonemes) and allows you to combine them quickly and easily to form virtually any word imaginable.

Supplied with an advanced ROM, you are provided with a 500 word dictionary to get you started. These can easily be added to by following the notes given in the comprehensive manual.

SPECIAL PRICE £32 (carr £2)

Continued ⟶

COMPUTER CONCEPT'S ROMS

ACCELERATOR	£30
CARETAKER Basic Utility	£23
DISC DOCTOR	£28
Graphics ROM	£29
TERMI	£25
COMMUNICATOR	£49
Printmaster	£24

Wordwise £26

Wordwise plus £40

We are giving away absolutely **FREE,** the superb Word-Aid ROM worth £24, with every WORDWISE PLUS package bought from us.

Word-Aid

The most comprehensive utilities ROM for Wordwise-Plus

Extend the power of your Wordwise Plus word processor with this most advanced ROM from Watford. By utilising the powerful Wordwise Plus programming language, WordAid provides a whole host of extra features, all accessed via a special new menu option. This ROM has been personally approved by Mr Charles Moir, the author of WORDWISE PLUS.

- Alphabetical sorting of names and addresses.
- Text transfer options.
- Chapter marker.
- Epson printer codes function key option.
- Search and display in preview mode.
- Embedded command removal.
- Print Multiple copies of a document.
- Multiple file options for print and preview.
- Address finder.
- Label printer.
- Mail-merger.
- Number/delete/renumber.
- Clear text-segment area.
- BBC B, B+ and Master compatible.

Only **£24**

(N.B. Word Aid requires a Disc Interface in your Micro)

HI-WORDWISE-PLUS DISC: **£5**

SPELL MASTER £42

Inter SHEET ONLY £37

INTER CHART ONLY: £25

Inter-WORD £36

MEGA-3 ROM

Interword, Intersheet & Interchart – 3 in one ROM **£76**

INTERBASE £49

All Prices Exclusive of VAT

VIEW

VIEW WORDPROCESSOR 2.1	£35
VIEW 3.0 ROM	**£48**
VIEW PROFESSIONAL	**£59**
HI-VIEW (for 6502 2nd Processor)	**£36**
VIEWSHEET (Acornsoft)	**£36**
VIEWSTORE	**£36**
VIEWSPELL with 80 track disc	**£29**
VIEWPLOT Disc (Please specify for Master 128 or Compact)	**£20**
VIEW-INDEX	**£12**
OVERVIEW Packs 1 & 2	**£69**

Watford's own Sophisticated VIEW PRINTER DRIVERS

Epson FX80 & Kaga KP (Disc)	£8
Juki & Brother HR15 (Disc)	£8
Silver Reed Printers (Disc)	£8

MINI OFFICE II

DISC Version for BBC B & B+	£14.00
DISC Version for BBC Master	£16.50
ROM Version	£43.00

(When ordering please specify for which Micro & 40 or 80 track Disc).

Advanced Computer Products

Advanced Disc Toolkit	£30
Advanced Disc Investigator	£25
Advanced 1770 DFS BBC	£29
Advanced 1770 DFS Master	£30

EPSON NLQ ROM

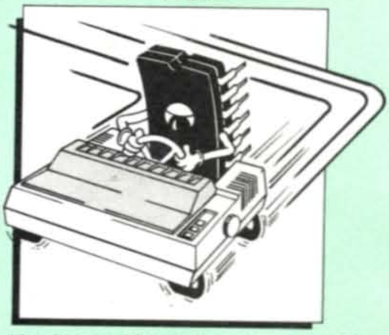
Harness the full potential of your Epson RX or FX printer. The NLQ ROM makes Epson printers produce Near Letter Quality output with optional proportional spacing, enlarged and underlined. Accessed by simple * commands from Basic, Wordwise and View (with driver) or almost any other language.

(Send an SAE for sample printout)

Only: £25

VIEW PRINTER DRIVER for NLQ ROM **£7**

VIEW PRINTER DRIVER ROM



View is a powerful word processor, but until now has seriously lacked in terms of printer support. With the launch of our Printer Driver ROM, which includes an extremely powerful and easy to use Printer Driver Generator, View users can find themselves in the realms of advanced word processing only at a small outlay.

The VPD extends View's printer command with a series of mnemonic commands. All standard highlight sequences are also supported. A large range of printers are supported by drivers contained within the ROM (the drivers can be downloaded and customised). Printers supported include: Epson's MX, RX, FX, FX, LX, JX80 range, HI80, KP810/910, PW1080, JP101, HR15, M1009, GLP, Panasonic KX-P1081/2, JUKI 6100, etc.

Other printers are readily supported by defining a Printer Driver using the built in Printer Driver Generator. The features mentioned below are available to both the built in Printer Drivers and user defined drivers (assuming the printer supports the features).

NLQ control, Underline, Bold, Proportional Spacing, Microspacing, Italic, Superscript, Subscript, Condensed, Enlarged, Double Strike, Set lines per inch numerically (e.g. LPI 6), Set characters per inch numerically (e.g. CPI 5), Select printer font, Select printer ribbon colour, Translation sequences, Emulation of BBC Character Set, Simple numeric expressions for certain operations, Full printer setup, Send control codes, Print prompt on screen, Redefinable Pad character, Pause for key press, Prompt to change daisywheel, and Execute * command when printing.

Other features include a very powerful on screen preview, with bold, italic, underline, super/subscript, enlarged highlights, and a special printer driver to allow memory based text to be previewed by View 1.4. Of course, View 1.4, 2.1 and 3.0 are all supported, as is Shadow RAM and 6502 Second Processors. The BBC B series and Master series of micros are supported. A comprehensive manual is supplied. All in all, a very professional product for the discerning user who wants power at their finger tips. (Write in for a detailed leaflet).

Price: Only £33

ROM-SPELL

ROMSPELL
ENGLISH DICTIONARY

Probably the most advanced and fastest spelling checker available for the BBC Micro. Compatible with View, Wordwise and Wordwise Plus ROMSPELL is simple to use with easy editing of incorrect words. Full facilities for editing the user dictionary to allow customisation to your personal needs. Dictionary includes over 30,000 words and is supplied with a Comprehensive manual.

NOT compatible with 1770 DFS.
(Please state 40 or 80 track disc)

Price still only: £25

DUMPOUT 3

A highly sophisticated screen dump ROM. This has to be the most flexible and powerful screen dump ROM yet produced for the BBC micro. It will put on paper anything you see on the screen, including full Mode 7 graphics. Also provided are window setting utilities and OSWORD calls to plot and read Mode 7 graphics pixels.

Facilities:

- Vertical and horizontal scaling in all graphics modes and mode 7
- Rotation of image by 90, 180 or 270 degrees
- Left hand margin setting
- Screen dump window setting
- Colours appear as grey scale
- Two tone fast dump
- Colour mask
- Mode 7 contrast expansion
- Mode 7 contiguous dump
- Key triggered and User Port triggered dumps

The Micro User Feb. 1985. 'Without reservation I wholeheartedly recommend the Dump Out 3 ROM as the ultimate screen dump facility for the BBC Micro . . . it must represent excellent value for money and surely cannot be beaten''.

For use with the following printers:

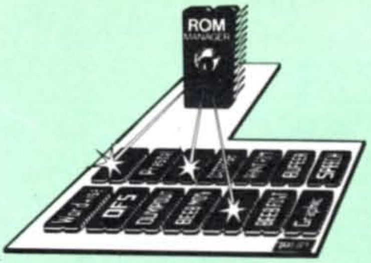
GLP, GP80/100/250, CANNON, STAR, KAGA/TAXAN, NEC, SHINWA CP80, GEMINI, EPSON MX/RX/FX, M1009, NEC PC8023, DMP100/200/400, Panasonic KX1081/82, Mannesman Tally and compatibles.

Only: £25

BBC SOFTWARE'S Popular Educational Software

● Maths with a Story 1 (Disc). 4 primary level maths programs	£11.25
● Maths with a Story 2 (Disc) 4 further maths programs	£11.25
● Picture Craft (Disc) 6 - 14 age group. Pack consists of flexible geometrical design & colouring programs	£17
● WAVES: Science Topics (Disc) CSC O Level Physics program.	£14.95
● RELATIONSHIP: Science (Disc) O Level Biology program.	£20.00
● BONDING: Science (Disc) O Level Chemistry program.	£20.00
● ELECTROMAGNETIC SPECTRUM (8 Discs) O Level program.	£20.00
● ELECTRONICS IN ACTION (Disc) O Level program	£19.95
● NEWTON & THE SPACE SHUTTLE (Disc) O Level program.	£20
● ECOLOGY (Disc) O Level program.	£20
● POLYMERS (Disc) O Level program.	£20
● Clasification & Periodic Table O Level. The suite is supplied with its own database of chemical elements which can be classified according to your own rule.	£20
● FOOD & POPULATION (Disc) O Level program.	£20
● MICROTECHNOLOGY (Cassette) O Level program.	£11.25
● A VOUS LA FRANCE (2 Cassettes) A French language home study aid.	£21.70
● DEUTSCH DIREKT! (Disc & Audio Cassette)	£19.95
● Modem Master (Disc)	£11.25
● ADVANCED TELETEXT SYSTEM	£8.65
● PERIOD TABLE SOFTWARE	£20
● Astronomy – Primary (Disc)	£12
● Computers at Work – Primary	£17.35
● Introducing Geography – Primary	£17
● **Introducing Geography 11-17yrs**	£17.50
● Electric Fields 6-14 years	£11.25
● BlackQueen Contract Bridge	£13
● Espana Viva – 3 Discs	£19.95
● A Vous La France Disc	£21.50

ROM MANAGER



Take control of your Sideways ROMs with ROM Manager. This powerful utility ROM gives you power over your sideways ROMs. Disable whole ROMs, send commands directly to named ROMs and many other powerful facilities.

"Provides comprehensive management of all your installed ROMs". (BEEBUG November '84.)

ONLY £20

ADDER

The only low cost EPROM Programmer for the BBC Micro that will program both the standard 21V and the new 12V5, 27128 EPROMS.
Adder is the ultimate EPROM programmer for the BBC Micro. It will program many different EPROMs up to the very latest 27256 32K devices.
The Adder unit connects to the User Port and draws its power from there too. The EPROM is mounted in a top quality ZIF socket. There are no switches or controls as Adder is entirely software controlled.
The Adder software provides sophisticated facilities for programming EPROMs from a RAM image produced by loading disc files. The software is menu driven and designed for ease of use.

Features:

- Two ultra fast programming algorithms or standard slow algorithm.
- Supports standard 21V programming and newer 12.5 volt EPROMs. (Software switched).
- The RAM image to be programmed can be built up in many ways. Sections of image can be loaded separately. Part programming. Read EPROM. Edit data in memory.
- Automatic processing to handle a list of files to program into the EPROM.
- Automatic disc buffering to allow programming of 32K 27256 devices from a 32K file without extra effort.
- Verification gives detailed error list and checksums are maintained. There is also a blank check facility.
- Works with all standard filing systems. Generates header code for RFS ROMs to allow Basic programs etc. to be stored in EPROM. More than one file per ROM permitted.
- Programs the following EPROMs: From 2K to 32K: 2516, 2716, 2532, 2732, 2764, 2764A, 27128, 27128A, 27256 (Both 12.5V and 21V).

£75 (£3 Carr)

TEX EPROM ERASERS

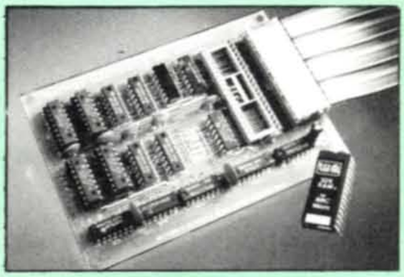
EPROMs need careful treatment if they are to survive their expected lifetime. Over erasure of EPROMs very rapidly turns them into ROMs! The TEX erasers operate following the manufacturers specifications to give the maximum possible working life by not erasing too fast. We use these erasers for all our own erasing work.

- **ERASER EB** – Standard version erases up to 16 chips. **£28** (carr £2)
- **ERASER GT** – Deluxe version erases up to 18 chips. Has automatic safety cut-off to switch off the UV lamp when opened. **£30** (carr £2)
- Spare UV tubes. **£9**

32K

SHADOW RAM-Printer Buffer

Expansion Board



A MUST FOR WORD PROCESSING

Watford Electronics now brings you the latest state-of-the-art MEMORY EXPANSION BOARD for your BBC microcomputer. Don't throw away your BBC B for a BBC B Plus or BBC Master. Just plug the ribbon cable into the 6502 processor socket, and fit the compact board inside the computer. Immediately you will gain not 16K or even 20K, but a massive 32K of extra RAM!!!

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It features information about:

- Memory Organisation
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- Disc Filing Systems
- ANFS
- Terminal Emulator & Editor
- View internal format
- Detailed differences between Model B, B+, Master 128K and Compact
- Comprehensive appendix on 65C12 instruction set

At the rear of the manual there are pull out circuit diagrams for the Master 128K.
A worth-while addition to any Master owner's library.

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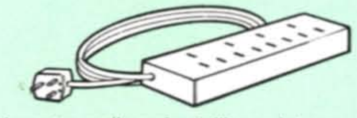

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(Please write in for further technical details)

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NEW

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- Operates in V21 (300/300), V23 (1200/75 and 75/1200) and proprietary V23 1200 mode.
- Connect it to any type of computer or terminal via the 25 way serial D connector or the BBC standard 5 pin Domino socket.
- A built in phone socket means your phone plugs straight through.
- A reset switch so the hardware makes it easy to restart – even when your software doesn't.
- Industry standard Hayes (C) compatibility means that this is one of the easiest modems to use. It can automatically work out the speed your computer is working at, and even the speed and protocol of the modem at the other end.
- Auto Call mode can dial using tone or pulse (the modem works that out too), and when it connects it will automatically determine the speed of the answering modem.
- Auto answer mode means the modem can be left unattended to answer calls from other modems, and of course it automatically works out the speed and protocol of the calling modem.
- The built in speaker and front panel LED's mean that you always know what the modem is doing.

. . . Features at any price.

- Proprietary V23 mode mean that two Aries 1200's can communicate at 1200/1200 and in this situation you can take advantage of the built in data compaction which reduces the volume of text you send by 30%.
- Built in scrambler means that data transferred between two Aries modems is automatically encrypted. The encryption code can be user defined for a totally private email system.
- User defined control commands means that the Aries can even be used from a dumb terminal or with non standard software.
- Front panel light include indicators for Power, Auto Answer Mode, Transmit, Receive, On line, Terminal ready and Carrier Detect. There's even an indicator to show the quality of the phone line.
- Internal watch-dog monitors the modems activity and in the event of a power failure or computer crash it automatically resets the modem. The Aries modem can never hold open your phone line or lock up your computer.
- Built in printer port allows the Aries to direct incoming data directly to a printer, text can be tagged so that it is selectively sent either to the printer or the computer.
- All modem setting are stored in solid state non volatile memory – no battery to go flat and hang crash the system.

Launch Offer **Only: £149**

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WAPPING
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"MIGHTIER THAN THE QUILL"

The WAPPING EDITOR

Watford Electronics bring professional quality Desktop Publishing to the Beeb. The Wapping Editor is a totally self contained mouse-driven desktop publishing package designed to run on the BBC B, B+ and Master computers. The massive 64K Rom contains ALL the software you need to do your own publishing. It 'Brings the Freedom of Press' to your fingertip. The software has a word processor, a graphics package, a page layout section and a font designer. Although very sophisticated, Wapping Editor is simplicity itself to use. Anyone already familiar with Quest Paint will immediately feel at home.

GRAPHICS PACKAGE

Imagine Quest Paint re-written to take advantage of the high resolution of Mode 0, well this is it. The Wapping Editor could well be worth buying for this facility alone. This must surely be the graphics.

WORD PROCESSOR

This section is a fully functional word processor specially tailored to suit the Desktop Publishing environment. Gone are all the unnecessary and cumbersome text formatting commands – these are dealt with in the 'Page-Layout' section. The features of this word processor include wordwrap, wordcount, insert/overwrite, move block, copy block, delete block, search and replace, browse, etc, many of these features being mouse controlled. Text input can of course be taken from existing word processor files like Wordwise, View, etc, but it is not necessary to have a separate word processor in order to use this package.

PAGE-LAYOUT SECTION

Page Layout becomes easy using these mouse-driven routines. The user simply 'pulls' a rectangle onto the page and states which text document or graphic is required to fill the space – it's as simple as that! Text can be automatically printed in a pre-set number of columns, left justified and/or right justified, or centered. Several different typefaces can be held in memory at one time. Graphics may be stretched, squahsed or cropped to fit any size rectangle. Graphics input can be from the software provided in the package or, using the 'mode convert', from any graphics mode screen.

THE FONT EDITOR

This is an enhanced version of the font editor contained in the Con-Quest ROM and allows the editing of ALL 95 characters. As well as being able to design your own typefaces, fonts from other DTP packages or from Quest Pain may be loaded into the editor and converted for use with the Wapping Editor. This sophisticated editor has numerous functions including slide, flip, invert and rotate individual characters or the whole font. Individual characters can be mirrored or copied and a mask feature allows you to superimpose two characters. Lines and columns can be inserted or deleted allowing the character to be stretched or squashed. This font editor will also allow 'font' and 'brush' files to be designed for use with Quest Paint.
This package is the latest in the line of integrated professional quality mouse-driven software from Watford Electronics, the company that adds power to Beeb.

Wapping Editor	Launch Offer: **£69**
Wapping Editor with Quest Mouse	**£89**

Specifications of all products are given in good faith but is subject to change without notice. Some items vary in their availability. Please ring for latest delivery situation.

Watford Electronics

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OUT in the far depths of space between planets you mine the glittering power crystals. But the only way to find them is by smashing open each asteroid in every swarm you can locate. So you turn to your trans-space scanner to seek out the nearest group, move to the navigation computer and hyperspace into the pack.

Immediately your attention is gripped by the need to avoid the oncoming asteroids – blowing them to pieces with your laser torpedoes. And when you finally blast the smallest pieces, if luck is with you a single crystal lies at the centre waiting to be picked up.

The controls of your mining ship are simple – Z and X for rotation, Shift to activate the impulse drives and Return for the torpedoes. Your vessel can take four direct hits from asteroids before being destroyed, and as you work, your ship systems automatically repair any damage and build up further power to resist destruction. Automatic tractor beams will pick up the power crystals as you pass near them: Be quick, they only have a short half-life and must be collected before they disintegrate.

Type in the listing using the Basic Editor – with tabs set to four – save the program and then ensure it is correct using the checksum program from the January issue. If the display is flickery you need to configure additional screen memory – you need 160k for two Mode 12 screens. So save the program and enter:

```
*CONFIGURE SCREENSIZE 20
```

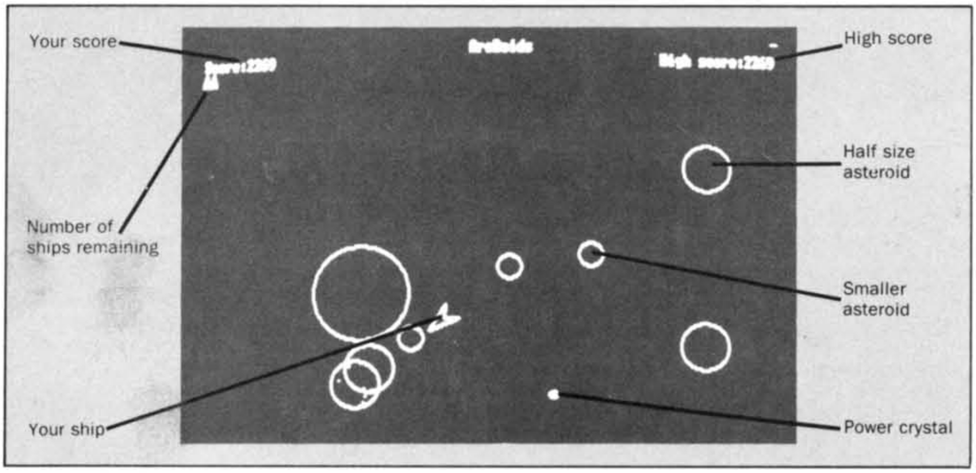
Press Control+Break and you can now load and run it successfully. It is very important to save your program before re-configuring because, as the various ram pages get swapped around, it may be shifted elsewhere in memory and lost forever. In order to save space the machine code has been converted to hexadecimal, but the full program showing exactly how the whole thing works is on this month's disc.

Although running in Mode 12, the program will operate in any screen mode because it uses only standard operating system calls – and despite this it still runs at a very good speed, which just goes to show how fast the Archimedes really is.

So when you play ArcRoids be prepared for some real action!

Meteor miner

Steve Turnbull presents ArcRoids – a fast action game for your Archimedes



```
   10 REM > $.ArcRoids
   20 REM by Steve Turnbull
   30 REM (c) The Micro User
   40 MODE12:OFF:ON ERROR PROCerror:END
   50 PROCinit:REPEAT PROCgameInit
   60 REPEAT:PROCinitScreen
   70 REPEAT:PROCdoScreen
   80 UNTIL data!heapPointer=1 OR !FNshi
p=-1
   90 message=FNmessage:PROCwait(wait)
  100 message=FALSE
  110 UNTIL numLives<=0 AND data!roidCou
nt>0
  120 UNTILFALSE:END
  130 DEF PROCerror
  140 ON ERROR OFF:PROCquit
  150 PRINTREPORT$" at ";ERL:ENDPROC
  160 DEF PROCquit:MODE MODE:*FX4
  170 ON:SOUND OFF:ENDPROC
  180 DEF PROCinit:Z%=RND(-TIME):*FX4,1
  190 VDU&FF17;&2810;&4428;&9244;&C6AA;
  200 SYS "OS_SWINumberFromString",,"OS_
Plot" TO OS_Plot
  210 SYS "OS_SWINumberFromString",,"OS_
Byte" TO OS_Byte
  220 shipType=1:roidType=2:missType=3
  230 dustType=4:maxObjects=200
  240 maxMiss=5:M%=0:angInc=RAD(12)
  250 shipAng=0:READ shipPts
  260 DIM s%(shipPts,2),pts%shipPts*3*4
  270 FOR P%=0 TO shipPts-1:FORX%=0TO2
  280 READ s%(P%,X%):NEXT:NEXT
  290 PROCturn(0):roidSize=96:screen%=1
  300 hiscore=0:bonus=0:bonusInc=10000
```

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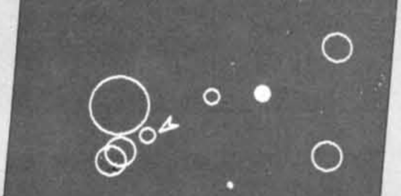
```
 310 PROCinitSound:PROCdecl:PROCassem
 320 mcode=code+code!0
 330 addObject=code+code!4
 340 makeSound=code+code!8
 350 code!(code!12)=data
 360 data!heapPointer=0
 370 PROCgenRoids(roidSize,3):ENDPROC
 380 DATA 5,0,0,40,1,20,-60,1,-20,20
 390 DATA 1,-20,-20,1,20,60
 400 DEF PROCgenRoids(S%,N%):LOCAL R%
 410 FOR R%=0 TO N%-1:IF RND(2)=1 THEN
 420 X%=RND(100)-50:Y%=RND(1024)-1
 430 IF RND(2)=1 X%+=1280
 440 ELSE
 450 Y%=RND(100)-50:X%=RND(1280)-1
 460 IF RND(2)=1 Y%+=1024
 470 ENDIF
 480 PROCaddObject(roidType,X%,Y%,RND(3
1)-16,RND(31)-16,S%,&7FFFFFFF)
 490 NEXT:ENDPROC
 500 DEF PROCaddObject(A%,B,C,D,E,F,G%)
 510 LOCAL B%,C%,D%,E%,F%:B%=B*&10000
 520 C%=C*&10000:D%=D*&10000
 530 E%=E*&10000:F%=F*&10000
 540 CALL addObject:ENDPROC
 550 DEF PROCinitSound:SOUNDON:VOICES4
 560 *ChannelVoice 1 Percussion-Snare
 570 *ChannelVoice 2 Percussion-Medium
 580 *ChannelVoice 3 Percussion-Soft
 590 *ChannelVoice 4 WaveSynth-Beep
 600 READ sounds%
 610 DIM soundTable sounds%*8
 620 FORS%=0TOsounds%-1:READC%,A%,P%,D%
 630 soundTable!(S%*8)=(A%<<16)OR(C%AND
&FFFF)
 640 soundTable!(S%*8+4)=(D%<<16)OR(P%A
ND&FFFF):NEXT:ENDPROC
 650 DATA 4,1,-7,0,16,2,-7,0,16
 651 DATA 3,-7,0,1,4,-15,200,2
 670 DEF PROCgameInit
 680 numLives=3:data!score=0
 690 message=-1:REPEAT:*FX21
 700 PROCdoScreen:UNTIL INKEY0=32
 710 level%=0:new=TRUE:bonus=5000
 720 data!heapPointer=0:ENDPROC
 730 DEF PROCinitScreen
 740 IF data!shipOffset=-1 OR new THEN
 750 PROCaddObject(shipType,640,512,0,0
,0,&7FFFFFFF)
 760 IF NOTnew numLives-=1
 770 ENDIF
 780 IF data!roidCount=0 OR new THEN
 790 level%+=1
 800 PROCgenRoids(roidSize,2+level%)
 810 ENDIF:nextMiss=0:new=FALSE
 820 message=FALSE:ENDPROC
 830 DEF PROCdoScreen
 840 LOCAL T%:T%=TIME+4
 850 SYS OS_Byte,112,screen%
```



```
 860 CLS:PROCkeys:PROCtext
 870 CALL mcode:PROCdisplay
 880 REPEAT UNTIL TIME>T%
 890 WAIT:SYS OS_Byte,113,screen%
 900 screen%=screen%MOD2+1
 910 ENDPROC
 920 DEF PROCkeys:*FX21
 930 IF !FNship=-1 ENDPROC
 940 IF INKEY-98 PROCturn(angInc)
 950 IF INKEY-67 PROCturn(-angInc)
 960 IF INKEY-1 PROCaccel(shipAng-PI/4,
2)
 970 IF INKEY-74 PROCfire(shipAng) ELSE
 nextMiss=0
 980 IF INKEY-56 REPEATOSCLI"FX21":UNTI
L NOT GET
 990 PROCaccel(shipAng-PI/4,0):ENDPROC
1000 DEF PROCturn(inc):shipAng+=inc
1010 LOCAL K%,Q%,X%,Y%,sin,cos
1020 sin=SIN(shipAng):cos=COS(shipAng)
1030 FORK%=0TOshipPts-1:Q%=pts%+K%*3*4
1040 Q%!0=s%(K%,0):X%=s%(K%,1)
1050 Y%=s%(K%,2):Q%!4=X%*cos+Y%*sin
1060 Q%!8=X%*sin-Y%*cos:NEXT:ENDPROC
1070 DEF FNship=data+objectHeap+data!sh
ipOffset*objSize
1080 DEF PROCaccel(Ang,v):v=v*&10000
1090 LOCAL X,Y,sin,cos:P%=FNship
1100 sin=v*SIN(Ang):cos=v*COS(Ang)
1110 X=P%!objXvec:Y=P%!objYvec
1120 P%!objXvec=(X+cos+sin-X/32)
1130 P%!objYvec=(Y+sin-cos-Y/32)
1140 ENDPROC
1150 DEF PROCdisplay:LOCALP%,x%,y%
1160 IF data!shipOffset>-1 P%=FNship:IF
 !P%>-1 ELSE ENDPROC
1170 x%=P%!4>>16:y%=P%!8>>16
1180 sin=SIN(shipAng)*20
1190 cos=COS(shipAng)*20
1200 data!shipX1=(x%+2*sin)<<16
1210 data!shipY1=(y%-2*cos)<<16
1220 data!shipX2=(x%+cos-sin)<<16
1230 data!shipY2=(y%+sin+cos)<<16
1240 data!shipX3=(x%-cos-sin)<<16
1250 data!shipY3=(y%-sin+cos)<<16
1260 ENDPROC
1270 DEF PROCtext
1280 PRINTTAB(36,0)"ArcRoids";
1290 PRINTTAB(1,1)"Score:";data!score
1300 IF data!score>hiscore hiscore=data
!score
1310 PRINTTAB(60,1)"High score:";hiscor
e
1320 IF data!score>bonus THEN
1330 numLives+=1:bonus+=bonusInc
1340 SOUND 4,-15,150,8
1350 ENDIF
1360 PRINTTAB(1,2)STRING$(numLives,CHR$
255);
1370 CASE message OF
1380 WHEN-1:PRINTTAB(30,12)"Press space
 to start"
1390 WHEN 1:PRINTTAB(36,12)"Level ";lev
el%+1
1400 WHEN 2:PRINTTAB(36,12)"Game Over"
1410 OTHERWISE
1420 ENDCASE:ENDPROC
1430 DEF PROCfire(Ang)
1440 IF data!shipOffset=-1 ENDPROC
1450 IF data!numMiss>=maxMiss ENDPROC
1460 IF TIME>nextMiss THEN
1470 LOCAL P%,s,x,y,px,py,vx,vy
1480 LOCAL mpx,mpy,mvx,mvy:P%=FNship
1490 px=P%!objXcrd>>16
1500 py=P%!objYcrd>>16
1510 vx=P%!objXvec>>16
1520 vy=P%!objYvec>>16
1530 mpx=px+pts%!4:mpy=py+pts%!8
1540 sin=SIN(Ang-PI/4)
1550 cos=COS(Ang-PI/4):s=22
1560 mvx=vx+s*cos+s*sin
1570 mvy=vy+s*sin-s*cos
1580 PROCaddObject(missType,mpx,mpy,mvx
,mvy,0,28)
1590 nextMiss=TIME+17:data!score-=1
1600 A%=2:CALL makeSound
1610 data!numMiss+=1
1620 ENDIF:ENDPROC
1630 DEF PROCwait(t):t=TIME+t:REPEAT
1640 PROCdoScreen:UNTILTIME>t:ENDPROC
1650 DEF FNmessage:LOCAL T%:wait=300
1660 IF data!roidCount=0 THEN
1670 T%=1
1680 ELSE
1690 IF numLives<=0 T%=2 ELSE T%=0
1700 ENDIF:=T%
1710 DEF PROCdecl:link=14:sp=13
1720 DIM data &1000
1730 P%=0:O%=data:[OPT 6
1740 .objType EQUD 0:.objXcrd EQUD 0
1750 .objYcrd EQUD 0:.objXvec EQUD 0
1760 .objYvec EQUD 0:.objParm EQUD 0
1770 .objTime EQUD 0:]:objSize=P%
1780 FOR pass=4 TO 6 STEP 2
1790 P%=0:O%=data:[OPT pass
1800 .heapPointer  EQUD 0
1810 .soundPointer EQUD soundTable
1820 .shipPointer  EQUD pts%
1830 .removeTemp   EQUD 0
1840 .collideTemp  EQUD 0
1850 .numMiss      EQUD 0
1860 .score        EQUD 0
1870 .shipOffset   EQUD 0
1880 .roidCount    EQUD 0
1890 .shipX1 EQUD 0:.shipY1 EQUD 0
1900 .shipX2 EQUD 0:.shipY2 EQUD 0
1910 .shipX3 EQUD 0:.shipY3 EQUD 0
1920 .Random       EQUD RND
1930 .gpbuffer     FNbytes(32,pass)
1940 .objectTemp   FNbytes(objSize,pass)
1950 .newRoidTemp  FNbytes(objSize,pass)
1960 .objectHeap   FNbytes(maxObjects*ob
jSize,pass)
1970 ]:NEXT:ENDPROC
1980 DEF FNbytes(size,pass):P%+=size
1990 IF (pass AND 4) THEN O%+=size
2000 =""
2010 DEF PROCassem
2020 DIM code &800:P%=code
2030 REPEAT READ a$:!P%=EVAL("&"+a$)
2040 P%+=4:UNTIL a$="END":ENDPROC
2050 DATA 10,FC,47C
2060 DATA 4A4,E92D4000,EB000002
2070 DATA EB000040,EB0000E5,E8BD8000
2080 DATA E92D4000,EB0000D1,E25AA001
2090 DATA 4A00000F,E028BA99,E898007F
2100 DATA E0811003,EB000021,E0822004
2110 DATA EB000025,E2566001,E888007F
2120 DATA 5AFFFFF4,E3500003,59C1014
2130 DATA 2411001,58C1014,E3E00000
2140 DATA E5880000,EAFFFFED,E3E00000
2150 DATA E58C001C,E3A00000,E58C0020
2160 DATA E59CE000,E3A07000,E1A0A00B
```

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```
2170 DATA E25EE001,458C7000,48BD8000
2180 DATA E8BB007F,E3700001,AFFFFF9
2190 DATA E8AA007F,E3500001,58C701C
2200 DATA E2877001,E3500002,59C0020
2210 DATA 2800001,58C0020,EAFFFFF0
2220 DATA E3510656,C2411517,C1A0F00E
2230 DATA E3710719,B2811517,E1A0F00E
2240 DATA E3520647,C242264D,C1A0F00E
2250 DATA E3720719,B282264D,E1A0F00E
2260 DATA E92D5FFF,EB00009B,E35A00C8
2270 DATA 8BD9FFF,E028BA99,E888007F
2280 DATA E28AA001,E58CA000,E8BD9FFF
2290 DATA E92D4000,EB000092,E25AA001
2300 DATA 48BD8000,E58CA010,E028BA99
2310 DATA E898007F,E3500001,A000003
2320 DATA E3500003,A000025,E59CA010
2330 DATA EAFFFFF4,E59CA000,E028BA99
2340 DATA E25AA001,4AFFFFF9,E028BA99
2350 DATA E898007F,E3500002,13500005
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2590 DATA EBFFFF9B,E8BD0400,E25AA001
2600 DATA AFFFFAC,EB00000E,EB00003A
2610 DATA E1A06E20,E2866002,E3A00004
2620 DATA EBFFFF92,EAFFFFF6,E92D4000
2630 DATA EB000033,E2000003,E3500003
2640 DATA EB000003,E3A06064,E3A00005
2650 DATA EBFFFF89,E8FD8000,E92D4001
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2770 DATA E1A00001,E1A01002,EF020046
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2840 DATA E8BD8006,E92D4000,EBFFFFEC
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2870 DATA E08FF100,F1A00000,EAFFFFF7
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2930 DATA EF000045,E1A01845,E3A02000
2940 DATA E3A00091,EF000045,EAFFFFE2
2950 DATA E3A00004,EF000045,E1A01000
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2970 DATA EAFFFFDB,E3A00045,EF000045
2980 DATA EAFFFFD8,E3A00004,EF000045
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3020 DATA E1A02180,E79C0002,E2822004
3030 DATA E79C1002,EF040186,E8BD9007
3040 DATA CB94,0,0,END
```

Get it right!

```
  10 =    0 0
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  40 = BA90 0
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  60 = D94D 0
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  80 = A4B4 B
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 500 = 8A1D C
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 540 = 72EC D
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 710 = F945 0
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2460 = D4C1 A
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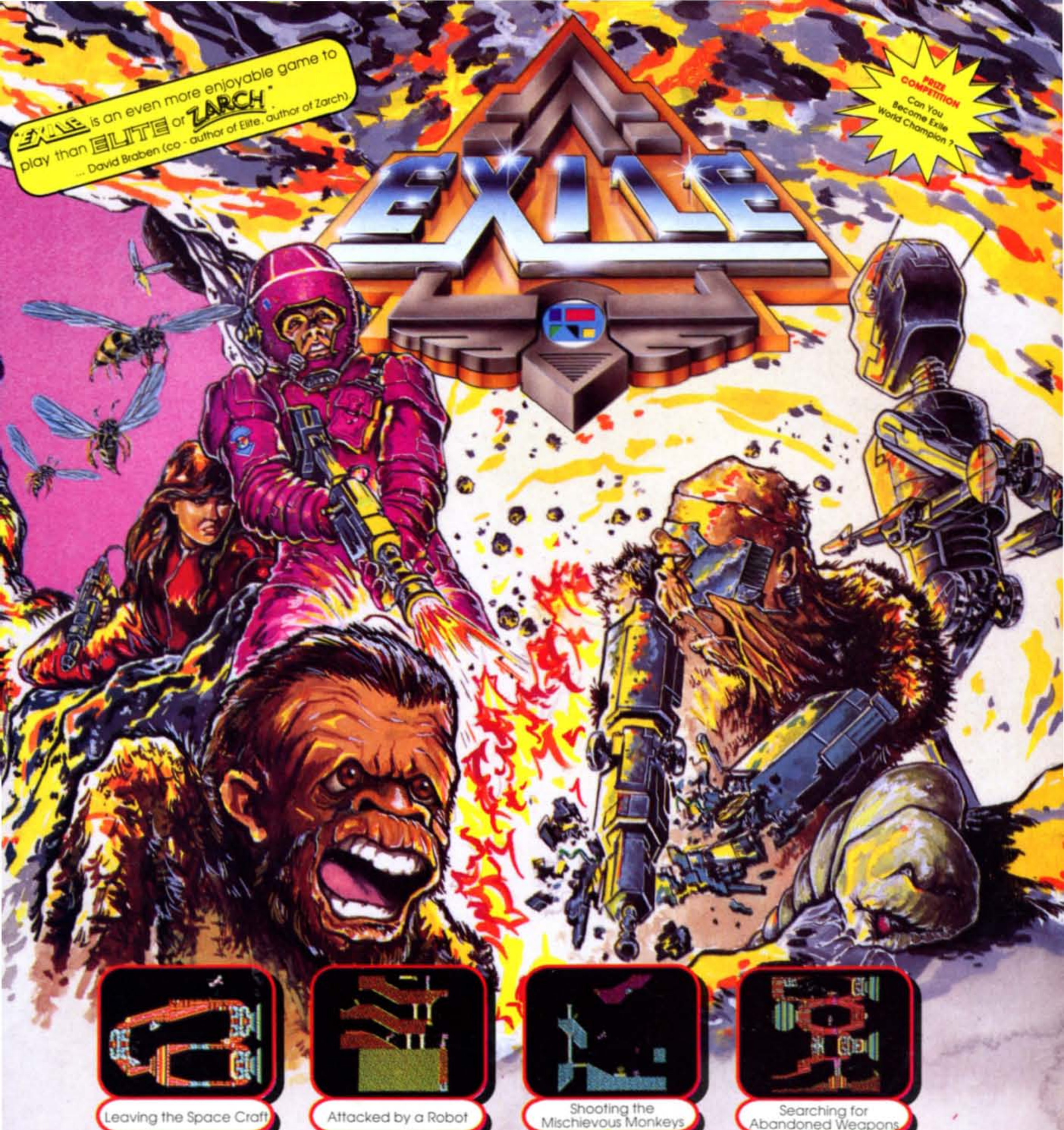
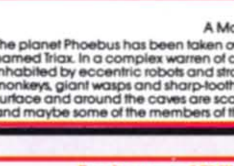
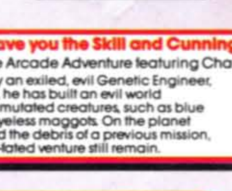
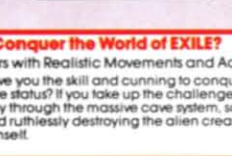
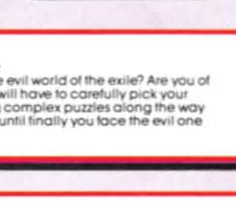

"EXILE is an even more enjoyable game to play than ELITE or ZARCH"
... David Braben (co - author of Elite, author of Zarch).
EXILE
PRIZE COMPETITION
Can You Become Exile World Champion ?


Leaving the Space Craft


Attacked by a Robot


Shooting the Mischievous Monkeys


Searching for Abandoned Weapons

Have you the Skill and Cunning to Conquer the World of EXILE?

A Massive Arcade Adventure featuring Characters with Realistic Movements and Actions.

The planet Phoebus has been taken over by an exiled, evil Genetic Engineer, named Triax. In a complex warren of caves, he has built an evil world inhabited by eccentric robots and strange mutated creatures, such as blue monkeys, giant wasps and sharp-toothed eyeless maggots. On the planet surface and around the caves are scattered the debris of a previous mission, and maybe some of the members of that ill-fated venture still remain.

Have you the skill and cunning to conquer the evil world of the exile? Are you of elite status? If you take up the challenge, you will have to carefully pick your way through the massive cave system, solving complex puzzles along the way and ruthlessly destroying the alien creatures, until finally you face the evil one himself.

Each copy of EXILE includes:

- The Exile game programs, including an enhanced version which will run on the BBC Master series and BBC Micros with sideways RAM.
- A Novella, which sets the scene for the Exile game.
- An Instruction Manual.

The game was designed and written by Peter Irvin and Jeremy Smith.

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(The screen pictures show the enhanced version of the games.)

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Screen shots from Atari ST version

"Three excellent games ... the adventure bargain of the year" – *Your Amiga, June, '88.*
"Each is a classic – so buy it".– *ST Update, July, '88.*

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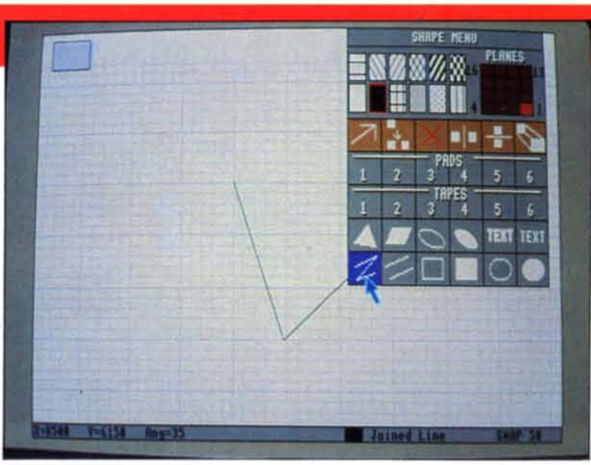
Archimedes SOFTWARE QUICKIES

Design by design

Steve Turnbull analyses a new draughting package

Product: Drawing Board
Price: £59
Supplier: Jansons, 93 North Street, Stilton, Peterborough PE7 3RR
Tel: 0733 244702



Choosing a shape

JANSONS is a new name to the software world and the company's programs show definite innovation. Drawing Board is a simple designers tool with great potential.

The package comes in a simple video cassette-sized box containing just disc, function key strip and three page manual – yes just three – which describes only how to boot the disc, how to transfer anti-alias fonts to your work disc and how to use the online manual.

All Jansons products have an on-screen manual instantly accessible at the touch of the Control key. Page control is via the mouse giving access to the next and last pages, index and exit. The Drawing Board instructions are 88 pages long and well laid out, complete with diagrams and pictures of the program menus.

One problem with this type of system is that it is difficult to proof read and this is demonstrated by a fair number of typos and missing words. However, despite this drawback, it is very easy to follow and it's immensely useful to be able to flip back and forth between manual and working screen.

The main screen consists of a light blue grid, a crosshair mouse pointer, a blue block top left surrounded by a black rectangle and a status line along the bottom. The screen is a window on to a much bigger work area and when the mouse is moved right to an edge the screen scrolls in that direction.

This is where the blue block comes into play: It represents the grid – which is only a single screen in size – and the black rectangle is the viewing window in relation to it. So you can tell where the working area is relative to your current position.

The status line covers such details as the pointer coordinates, its angle in relation to a reference point that you can set, current colour, operation and snap value – the axes increments that specified points will snap to. For example with snap at 50 setting a point at 239 will automatically move to 250.

Pressing Menu on the mouse brings up the main menu which gives six options in icon form – file handling, notepad, text, shape, calculator and printer. The file handling gives you the choice of load, save, delete and merge – but no facilities to look at what's on the disc. And the notepad is simply a place to put reminders and information about your current drawing.

The shape option provides access to the most used submenu – it would have been better to go to this one first and have a second click for the main menu. The choices here allow you to draw the various built-in geometric shapes provided by the operating system in any colour and pattern – which can be defined. You can also alter the drawing using move, copy, delete, mirror and rescaling options.

The facilities mentioned so far don't demonstrate much difference between this and any other drawing package – but the key is that Drawing Board is object-oriented. This buzzword means that the software does not store the picture information on screen, but instead records the objects that have been created. For example, in a screen-oriented program, drawing a square puts a number of pixels on the screen and once it's there you can't get rid of it – if you overdraw something you wanted you are stuck.

But an object-oriented program keeps a list of what's been drawn and if you don't like what you've done you can just move or delete it, and the screen can be redrawn. In addition, the working area can occupy much more than just one screen size.

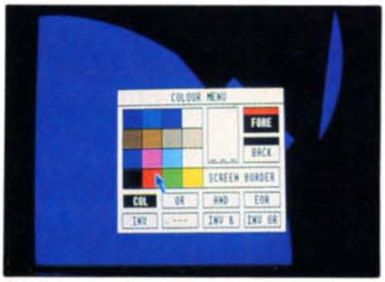
The second major feature of Drawing Board is that objects can be placed on up to 16 separate planes, of which any selection can be on current display – from one to all of them – and can be printed together or separately.

The most obvious application is in circuit board design where you can place components on the grid on one plane and place connections on one or more of the others. By printing out the planes separately you get both the component placement and the circuit design in perfect alignment.

Jansons obviously see this as the best application too and has provided shape options to aid circuit board design – this is a good package just looking for applications.

Basic graphics

Teri Paul makes her programming easier



Selecting a new colour

Product: ArcImEd
Price: £24.95
Supplier: Jansons, 93 North Street, Stilton, Peterborough PE7 3RR
Tel: 0733 244702

CREATING screens of text and graphics using Basic is a tremendously time-consuming and frustrating business – every time you change one command it usually means that many of the next ones need to be modified to compensate.

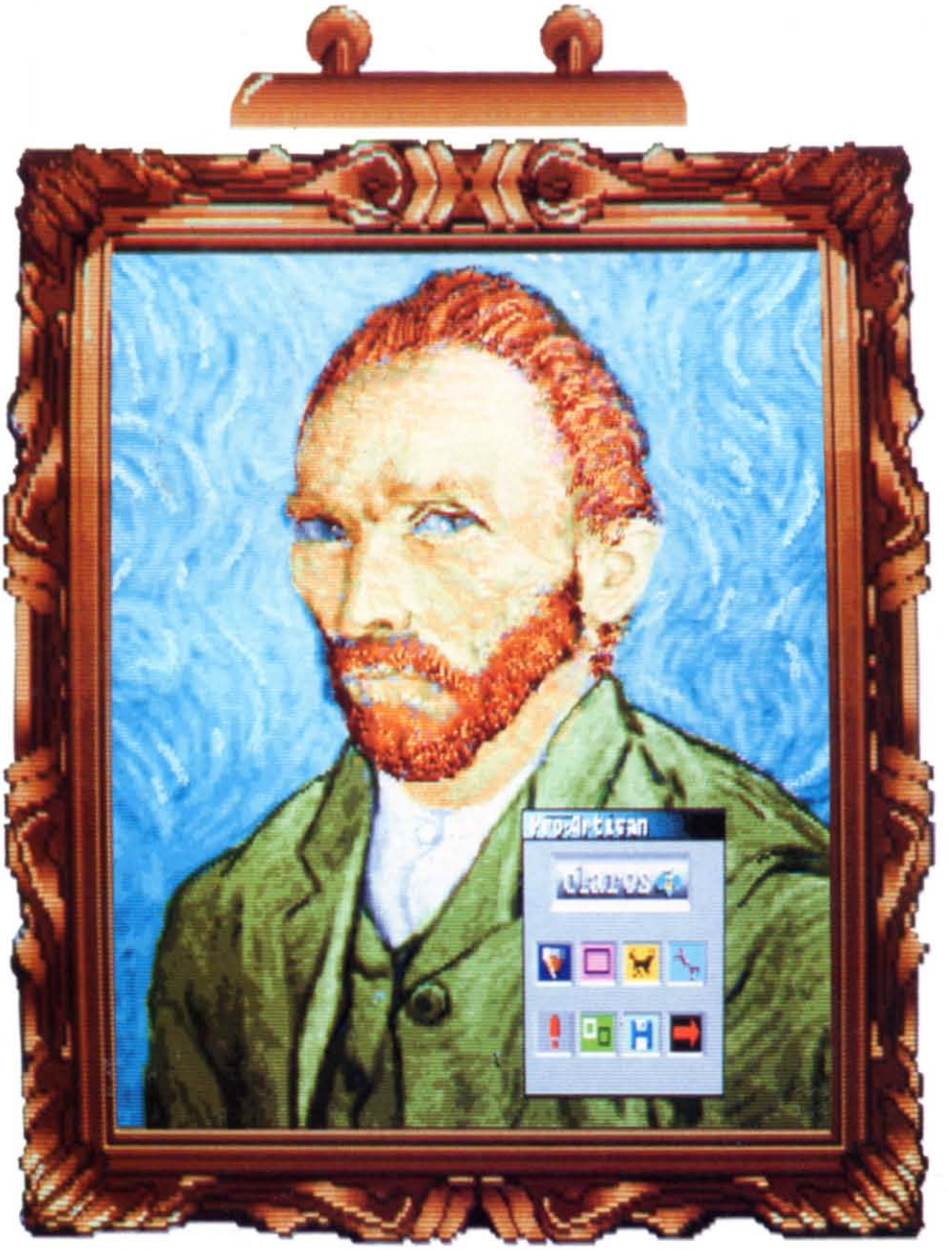
ArcImEd – Archimedes Image Editor – is designed to make that particular job easier. Like Drawing Board, the program is primarily another object-oriented designer but without many frills – you get basic shape functions, colour control and a number of rotate and reflect commands are also available on either the entire or a portion of the screen.

You can load, save and merge the images as you might expect, but with one special addition – the ability to create Basic programs composed of the instructions needed to produce the picture.

This facility is further enhanced by options to allow the saved program to be created as a procedure, with relative – rather than absolute – coordinates, with matrix transformations permitted on every point. You can also select whether or not to include the colour commands.

Unfortunately, and despite the obvious good intentions, I found ArcImEd very difficult to use. The online manual was very handy because the program was hardly intuitive and I had to keep referring to it. In the final analysis I can't decide whether the software really is worthwhile. Jansons clearly use it to help write the manuals – but beyond that I'm not sure.

WORK OF ART BY VAN GOGH.



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Together you can fend off attacks from front and rear

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Imagine Zenon .....

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Beaming down to the surface of Zenon from your intergalactic cruiser immediately puts you into the action amongst a host of deadly androids, meteorites, fireballs, missiles and other unforeseen perils. Set against a background of scrolling stars you must run for your life or boost into the air using your atomically-powered jetpack.

Initially you are armed with only a simple Repeat Laser which you will quickly find inadequate to deal with the sheer volume of enemies. Watch out for the opportunity to grab more powerful weaponry including the Twin-Shot Laser, Atomic Blaster and not forgetting the ultimate weapon - the lethal Machine Laser.

No space explorer has yet reached the heart of Zenon. There are 250 levels to be completed and new inconceivable monstrous androids will try to thwart you as you advance.

No one knows all of the aliens that await you, but many will undoubtedly require several hits to destroy them. Documented proof exists of only a few: the massive Terrapedes (snake-like androids), Orbitroids (giant steel eyes), Roamodrons (walking machines) and various types of Shapeoids; plus Rods, Zebbadoids, Packoids, Duckadrons and Rambodroids.

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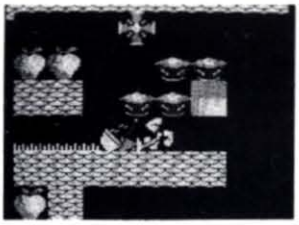

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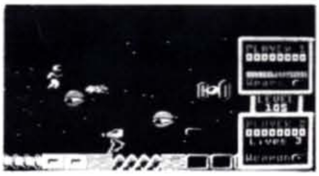

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Editing Map A

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The modular approach

Richard Phillips explores the Risc method of file typing

ONE of the most useful elements of the Archimedes operating system is file typing but, unfortunately there aren't many commands to deal with it. This program implements a module called FileType giving two new commands to make the whole thing more flexible.

Type in the listing using the Basic Editor – with tabs set to three spaces – then save it. Ensure you've made no errors using the Archimedes Get it Right! routine published in the January issue of *The Micro User*. When you run the program it automatically saves the module as FileType. Now load it with:

```
*RMLoad FileType
```

or just double-click it from the DeskTop. If you get *No room in RMA* just quit whatever program you're in to the Arthur supervisor and then issue the RMLoad command.

Once loaded you have access to the new commands, *FileType and *ShowTypes. The former allows you to set the type of a particular file using the text name of the type or the hex code rather than just the code needed with built-in *SetType. The *ShowTypes provides you with a list of the currently allocated file types.

This means that you can issue the following command to set the file type of a file *abcd* to *Text* with:

```
*FileType abcd Text
```

which is a great improvement on:

```
*SetType abcd &FFF
```

*Showtypes produces a list of the currently allocated file types and their appropriate hexadecimal number. You can specify a range of file types to be checked in three ways:

```
*ShowTypes <start value>
*Showtypes <start value> <end value>
*ShowTypes <start value> <+offset>
```

The arguments can be expressed as either a number or a string. For instance:

```
*ShowTypes &899
```

will list all the file types from &899 up to &FFF.

```
*Showtypes Palette Data
```

lists from Palette (&FED) to Data (&FFD) and:

```
*ShowTypes Palette +4
```

gives those from Pallette (&FED) to Palette+4 (&FF0). The program also sets up two file types called *Asm* and *Batch* which have the values &EEE and &899.

You can add your own file types by placing the text and associated number into a table called *types*. This is quite simple – you just put a new command after line 3600 like this:

```
3605    FNtyp(&xxx,"new_type")
```

You are allowed a maximum of eight characters for the type name.

If you want the operating system to do anything with your file types you must setup the corresponding Alias$@LoadType and/or Alias$@RunType system variables.

You can use the *Show command to see the way in which these variables are initialised by the rest of the system. For example, to make the operating system run the ASM program when a file with type *Asm* is double-clicked from the DeskTop:

```
*Set Alias$@RunType_EEE Asm %0
```

Note that there should be a trailing space after the %0.

If we have a file called *abcd* which is being *RUN – by whatever method – the operating system looks through its list of run Aliases then replaces the **RUN abcd* with:

```
*Asm abcd
```

The %0 adds any parameters after the **RUN abcd* to the **ASM abcd*.

```
   10 REM >TypeSource
   20 REM by Richard M.Phillips
   30 REM (c) The Micro User
   40 REM Set TAB to indent 3 spaces
   50 MODE0
   60 sp       =13:fromReg = 0
   70 toReg    = 2:lenReg  = 8
   80 typReg   = 8:tmpReg  = 9
   90 countReg= 9:n$=CHR$0
  100 t$=CHR$9:x$=CHR$10:r$=CHR$13
  110 varTypString = 0
  120 setTyp        = &12
  130 getFileTyp    = 18
  140 lookUpFileTyp= &42
  150 overflowFlag = 1<<28
  160 DIM code &1000
  170 FOR pass = 4 TO 7 STEP 2
  180 O%=code:P%=0
  190 [opt pass
  200    EQUD  0
```

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```
 210    EQUD  initialisationCode
 220    EQUD  0
 230    EQUD  serviceCall
 240    EQUD  titleString
 250    EQUD  helpString
 260    EQUD  keywordTable
 270    EQUD  0:EQUD  0
 280    EQUD  0:EQUD  0
 290 .titleString
 300    EQUS  "FileType"+n$:ALIGN
 310 .helpString
 320    EQUS  "FileType"+t$+"1.00 (1 Ja
n 1989)"+n$:ALIGN
 330 .keywordTable
 340    EQUS  "FileType"+n$:ALIGN
 350    EQUD  fileTyp
 360    EQUD  &00020302
 370    EQUD  fileTypSyntax
 380    EQUD  fileTypHelp
 390    EQUS  "ShowTypes"+n$
 400    ALIGN
 410    EQUD  showTyps
 420    EQUD  &00020300
 430    EQUD  showTypsSyntax
 440    EQUD  showTypsHelp
 450    EQUS  "Author"+n$
 460    ALIGN
 470    EQUD  0:EQUD  0:EQUD  0
 480    EQUD  authorHelp:EQUB  0
 490    ALIGN
 500 .fileTypSyntax
 510    EQUS  "Syntax: *FileType <filen
ame> <file type>"+n$:ALIGN
 520 .fileTypHelp
 530    EQUS  "*FileType provides a sim
ple way to "SetType" a file. Spaces can
be inserted into the file type by using
the OS variable <Space>."+r$+"Syntax: *F
ileType <filename> <filetype>"+n$:ALIGN
 540 .showTypsSyntax
 550    EQUS  "Syntax: *ShowTypes [star
t] [<+>offset
 end]"+n$:ALIGN
 560 .showTypsHelp
 570    EQUS  "*ShowTypes provides a li
st of allocated file types. Spaces can b
e inserted into the file type by using t
he OS variable <Space>."+r$+"Syntax: *Sh
owTypes [start] [<+>offset
 end]"+n$
 580    ALIGN
 590 .authorHelp
 600    EQUS  "Filetype was written by
Richard M. Phillips."+r$+"(c) The Micro
User."+n$:ALIGN
 610 .initialisationCode
 620    STMFD (sp)!,{r14}
 630    ADR   r0,spaceHack
 640    ADR   r1,spaceValue
 650    MOV   r2,#1
 660    MOV   r3,#0
 670    MOV   r4,#varTypString
 680    SWI   "XOS_SetVarVal"
 690    LDMFD (sp)!,{r14}
 700    ORRVSS   pc,r14,#overflowFlag
 710    MOV   pc,r14
 720 .spaceHack
 730    EQUS  "Space"+n$:ALIGN
 740 .spaceValue
 750    EQUB  &a0:EQUB  0:ALIGN
 760 .fileTyp
 770    STMFD (sp)!,{r14}
 780    ADR   toReg,filename
 790    BL    getArg
 800    ADR   toReg,typBuf
 810    BL    getArg
 820    STMFD (sp)!,{toReg}
 830    MOV   r0,#10
 840    ADR   r1,typBuf
 850    SWI   "XOS_ReadUnsigned"
 860    STRVC r2,typCounter
 870    LDMFD (sp)!,{toReg}
 880    BVC   setNumericFileTyp
 890    CMP   lenReg,#8
 900    ADRGT r0,lenErr
 910    LDMGTFD  (sp)!,{r14}
 920    ORRGTS   pc,r14,#overflowFlag
 930    BLNE  padTyp
 940    BL    findTyp
 950    LDMVSFD  (sp)!,{pc}
 960 .setNumericFileTyp
```

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```
  970    LDR   typReg,typCounter
  980    LDR   tmpReg,initialTyp
  990    CMP   typReg,#0
 1000    BMI   argErr
 1010    CMP   typReg,tmpReg
 1020    BGT   argErr
 1030    BL    setFileTyp
 1040    LDMFD (sp)!,{pc}
 1050 .argErr
 1060    ADR   r0,invalidErr
 1070    LDMFD (sp)!,{r14}
 1080    ORRS  pc,r14,#overflowFlag
 1090 .lenErr
 1100    EQUD  &12345678
 1110    EQUS  "File type longer than 8
characters"+n$:ALIGN
 1120 .invalidErr
 1130    EQUD  &12345679
 1140    EQUS  "Illegal file type"+n$
 1150    ALIGN
 1160 .findTyp
 1170    STMFD (sp)!,{r14}
 1180    ADR   tmpReg,typBuf
 1190    LDMIA tmpReg,{r7,r8}
 1200    LDR   countReg,initialTyp
 1210 .countLoop
 1220    MOV   r0,#getFileTyp
 1230    MOV   r2,countReg
 1240    SWI   "XOS_FSControl"
 1250    LDMVSFD  (sp)!,{pc}
 1260    CMP   r2,r7
 1270    CMPEQ r3,r8
 1280    BEQ   foundFileTyp
 1290    CMP   countReg,#0
 1300    SUBGE    countReg,countReg,#1
 1310    BGE   countLoop
 1320    ADR   r0,notFound
 1330    LDMFD (sp)!,{tmpReg}
 1340    ORRS  pc,tmpReg,#overflowFlag
 1350 .foundFileTyp
 1360    STR   countReg,typCounter
 1370    LDMFD (sp)!,{pc}
 1380 .padTyp
 1390    MOV   r0,#ASC(" ")
 1400 .padLoop
 1410    STRB  r0,[toReg],#1
 1420    ADD   lenReg,lenReg,#1
 1430    CMP   lenReg,#8
 1440    BLT   padLoop
 1450    MOV   pc,r14
 1460 .setFileTyp
 1470    STMFD (sp)!,{r14}
 1480    MOV   r0,#setTyp
 1490    ADR   r1,filename
 1500    LDR   r2,typCounter
 1510    SWI   "XOS_File"
 1520    LDMFD (sp)!,{pc}
 1530 .notFound
 1540    EQUD  &1234567a
 1550    EQUS  "Unknown File Type"+n$
 1560    ALIGN
 1570 .initialTyp
 1580    EQUD  &00000fff
 1590 .typCounter
 1600    EQUD  0
 1610 .filename
 1620 .buffer:FNdcb(256):ALIGN
 1630 .typBuf:FNdcb(256):ALIGN
 1640 .showTyps
 1650    STMFD (sp)!,{r14}
 1660    CMP   r1,#0
 1670    STREQ r1,startTyp
 1680    MOVEQ tmpReg,#&ff
 1690    ORREQ tmpReg,tmpReg,#&f00
 1700    STREQ tmpReg,endTyp
 1710    BEQ   listTyps
```

```
 1720    STMFD (sp)!,{r1}
 1730    ADR   toReg,typBuf
 1740    BL    getArg
 1750    STMFD (sp)!,{r0}
 1760    MOV   r0,#10
 1770    ADR   r1,typBuf
 1780    SWI   "XOS_ReadUnsigned"
 1790    BVC   firstNumeric
 1800    CMP   lenReg,#8
 1810    ADRGT r0,lenErr
 1820    LDMGTFD  (sp)!,{countReg,tmpReg
,r14}
 1830    ORRGTS   pc,r14,#overflowFlag
 1840    ADR   toReg,typBuf
 1850    ADD   toReg,toReg,lenReg
 1860    BL    padTyp
 1870    BL    findTyp
 1880    LDMVSFD  (sp)!,{r1,tmpReg,r14}
 1890    ORRVSS   pc,r14,#overflowFlag
 1900    LDR   r2,typCounter
 1910 .firstNumeric
 1920    LDMFD (sp)!,{fromReg}
 1930    STR   r2,startTyp
 1940    LDMFD (sp)!,{r1}
 1950    CMP   r1,#2
 1960    MOVNE tmpReg,#&ff
 1970    ORRNE tmpReg,tmpReg,#&f00
 1980    STRNE tmpReg,endTyp
 1990    BNE   listTyps
 2000    ADR   toReg,typBuf
 2010    BL    getArg
 2020    ADR   r1,typBuf
 2030    LDRB  tmpReg,typBuf
 2040    CMP   tmpReg,#ASC("+")
 2050    ADDEQ r1,r1,#1
 2060    MOVNE tmpReg,#0
 2070    MOVEQ tmpReg,#1
 2080    SUBEQ lenReg,lenReg,#1
 2090    STRB  tmpReg,offset
 2100    BNE   noCopy
 2110    MOV   tmpReg,lenReg
 2120    ADR   fromReg,typBuf
 2130 .moveLoop
 2140    LDRB  toReg,[fromReg,#1]
 2150    STRB  toReg,[fromReg]
 2160    ADD   fromReg,fromReg,#1
 2170    SUB   tmpReg,tmpReg,#1
 2180    CMP   tmpReg,#0
 2190    BGT   moveLoop
 2200    STRB  tmpReg,[fromReg]
 2210    ADR   r1,typBuf
 2220 .noCopy
 2230    MOV   r0,#10
 2240    SWI   "XOS_ReadUnsigned"
 2250    BVC   secondNumeric
 2260    CMP   lenReg,#8
 2270    ADRGT r0,lenErr
 2280    LDMGTFD  (sp)!,{r14}
 2290    ORRGTS   pc,r14,#overflowFlag
 2300    ADR   toReg,typBuf
 2310    ADD   toReg,toReg,lenReg
 2320    BL    padTyp
 2330    BL    findTyp
 2340    LDMVSFD  (sp)!,{r14}
 2350    ORRVSS   pc,r14,#overflowFlag
 2360    LDR   r2,typCounter
 2370 .secondNumeric
 2380    LDRB  tmpReg,offset
 2390    CMP   tmpReg,#0
 2400    LDRNE countReg,startTyp
 2410    ADDNE r2,r2,countReg
 2420    STR   r2,endTyp
 2430 .listTyps
 2440    LDR   tmpReg,startTyp
 2450    CMP   tmpReg,#0
 2460    ADRMI r0,badErr
```

```
 2470    LDMMIFD  (sp)!,{r14}
 2480    ORRLTS   pc,r14,=overflowFlag
 2490    LDR   typReg,endTyp
 2500    MOV   r0,=&ff
 2510    ORR   r0,r0,=&f00
 2520    CMP   typReg,r0
 2530    CMPLE tmpReg,r0
 2540    CMPLE tmpReg,typReg
 2550    ADRGT r0,badErr
 2560    LDMGTFD  (sp)!,{r14}
 2570    ORRGTS   pc,r14,#overflowFlag
 2580    SWI   "OS_WriteS"
 2590    EQUS  x$+r$+"File Types:"+x$+r$
 2600    EQUS  x$+r$+" Type   Text"
 2610    EQUS  x$+r$+x$+r$+n$:ALIGN
 2620    LDR   countReg,startTyp
 2630    SUB   countReg,countReg,#1
 2640 .typLoop
 2650    ADD   countReg,countReg,#1
 2660    LDR   typReg,endTyp
 2670    CMP   countReg,typReg
 2680    BGT   noMoreTyps
 2690    MOV   r0,#getFileTyp
 2700    MOV   r2,countReg
 2710    SWI   "XOS_FSControl"
 2720    AND   typReg,r2,#&ff
 2730    CMP   typReg,#ASC("&")
 2740    BEQ   typLoop
 2750    STMFD (sp)!,{r2,r3}
 2760    SWI   "OS_WriteS"
 2770    EQUS  " &"+n$:ALIGN
 2780    MOV   r0,countReg
 2790    ADR   r1,numberBuf
 2800    MOV   r2,#9
 2810    SWI   "XOS_ConvertHex8"
 2820    LDMFD (sp)!,{r2,r3}
 2830    LDMVSFD  (sp)!,{r14}
 2840    ORRVSS   pc,r14,#overflowFlag
 2850    ADD   r0,r0,#5
 2860    SWI   "OS_Write0"
 2870    SWI   "OS_WriteS"
 2880    EQUS  " "+n$:ALIGN
 2890    ADR   typReg,typBuf
 2900    STMIA (typReg)!,{r2,r3}
 2910    MOV   r0,#0
 2920    STMIA typReg,{r0}
 2930    SUB   r0,typReg,#8
 2940    SWI   "OS_Write0"
 2950    SWI   "OS_NewLine"
 2960    B     typLoop
 2970 .noMoreTyps
 2980    LDMFD (sp)!,{pc}
 2990 .numberBuf
 3000    FNdsd(9):ALIGN
 3010 .badErr
 3020    EQUD  &1234567b
 3030    EQUS  "Illegal parameter(s) to
*ShowTypes"+n$:ALIGN
 3040 .startTyp:EQUD  0
 3050 .endTyp:EQUD  0
 3060 .offset:EQUD  0
 3070 .serviceCall
 3080    CMP   r1,#lookUpFileTyp
 3090    MOVNE pc,r14
 3100    STMFD (sp)!,{r8-r9}
 3110    ADR   typReg,typs
 3120 .checkLoop
 3130    LDR   countReg,[typReg],#4
 3140    CMP   countReg,#0
 3150    LDMMIFD  (sp)!,{r8-r9}
 3160    MOVMI pc,r14
 3170    CMP   r2,countReg
 3180    ADDNE typReg,typReg,=8
```

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```
3190    BNE   checkLoop
3200    LDMIA typReg,{r2,r3}
3210    LDMFD (sp)!,{r8-r9}
3220    MOV   r1,#0
3230    MOV   pc,r14
3240 .getArg
3250    STMFD (sp)!,{r14}
3260    BL    skipSpaces
3270    MOV   tmpReg,fromReg
3280    LDRB  r1,[fromReg]
3290    BL    eoln
3300    CMP   r1,#0
3310    LDMEQFD  (sp)!,{pc}
3320 .copyLoop
3330    LDRB  r1,[fromReg],#1
3340    CMP   r1,#ASC(" ")
3350    SUBEQ fromReg,fromReg,#1
3360    BEQ   copiedArg
3370    AND   r1,r1,#&7f
3380    STRB  r1,[toReg],#1
3390    BL    eoln
3400    CMP   r1,#0
3410    BNE   copyLoop
3420    SUB   toReg,toReg,#1
3430 .copiedArg
3440    SUB   lenReg,fromReg,tmpReg
3450    MOV   tmpReg,#0
3460    STRB  tmpReg,[toReg]
3470    LDMFD (sp)!,{pc}
3480 .skipSpaces
3490    LDRB  r1,[fromReg],#1
3500    CMP   r1,#ASC(" ")
3510    SUBNE fromReg,fromReg,#1
3520    BEQ   skipSpaces
3530    MOV   pc,r14
3540 .eoln
3550    CMP   r1,#0
3560    CMPNE r1,#13
3570    CMPNE r1,#10
3580    MOVEQ r1,#0
3590    MOV   pc,r14
3600 .typs
3610    FNtyp(&eee,"Asm")
3620    FNtyp(&899,"Batch")
3630    EQUD  -1
 3640 ]:NEXT
 3650 SYS "OS_File",10,"FileType",&FFA,,
code,O%:END
 3660 DEF FNdsd(size):LOCAL S%
 3670 FOR S%=0 TO size-1
 3680    IF (pass AND 4) THEN
 3690       !O%=0:O%+=4:P%+=4
 3700    ELSE
 3710       !P%=0:P%+=4
 3720    ENDIF
 3730    NEXT:=""
 3740 DEF FNdcb(size):LOCAL S%
 3750 FOR S%=0 TO size-1
 3760    IF (pass AND 4) THEN
 3770       ?O%=0:O%+=1:P%+=1
 3780    ELSE
 3790       ?P%=0:P%+=1
 3800    ENDIF
 3810    NEXT:=""
 3820 DEF FNtyp(typ,typ$)
 3830 [opt pass
 3840    EQUD  typ
 3850    EQUS  LEFT$(typ$+STRING$(8," ")
,8)
 3860 ]:=0
```

Get it right!

```
  10 =    0 0
  20 =    0 0
  30 =    0 0
  40 =    0 0
  50 = FA1B B
  60 = 9410 3
  70 = F1DC E
  80 = 1868 1
  90 = 1C1F 0
 100 = 5B53 4
 110 = 3EA8 9
 120 = 8841 D
 130 = BE8D F
 140 = CAB9 A
 150 = 23B6 A
 160 = 749B 7
 170 = 6C33 0
 180 = 307E 2
 190 = 6EDE 5
 200 = B504 A
 210 = 335D E
 220 = B504 8
 230 = 76D0 E
 240 = B94A 0
 250 = BC26 7
 260 = FCF3 5
 270 = 5081 D
 280 = 5081 B
 290 = 2F0B B
 300 = CB5F 8
 310 = DBAC 1
 320 = 94A8 3
 330 = 5E8C 7
 340 = CB5F 6
 350 = 54DB 6
 360 = E07B E
 370 = 9E62 0
 380 = 81BB 6
 390 = E0A1 5
 400 = 24FA C
 410 = CCD7 5
 420 = C039 5
 430 = D6AF B
 440 = B786 7
 450 = 291D 1
 460 = 24FA 4
 470 = BA58 0
 480 = 2D22 5
 490 = 24FA 2

 500 = 74CA 8
 510 = A055 9
 520 = 17FA E
 530 = 942A 0
 540 = 22CB 0
 550 =  A50 0
 560 = 15F9 5
 570 = 96E0 7
 580 = 24FA F
 590 = F699 E
 600 = 9604 8
 610 = 214A 1
 620 = 9C32 2
 630 =  39F F
 640 = 57AA 4
 650 = 2323 9
 660 = 45B6 9
 670 = 2714 0
 680 = 4659 7
 690 = 5487 0
 700 = 388C 2
 710 = 1C0B 2
 720 = 52D2 F
 730 = 474F 6
 740 = 530B 1
 750 = 27BB A
 760 = D984 5
 770 = 9C32 8
 780 =  775 C
 790 = 9A68 C
 800 = E343 A
 810 = 9A68 F
 820 = B5E2 1
 830 = 45D1 5
 840 =  507 6
 850 = D192 7
 860 = B467 3
 870 = DD61 E
 880 = C56E 7
 890 = E9C7 6
 900 = 7C52 F
 910 = D419 8
 920 = 3B9A F
 930 = 31B9 A
 940 = 5A03 2
 950 = 6BAA F
 960 = E897 D
 970 = 637A 1
 980 = 1761 2

 990 = 3B3E B
1000 = DC78 E
1010 = FA8A A
1020 = C2E8 E
1030 = 220F A
1040 = C378 4
1050 = D18F B
1060 = 90E8 F
1070 = 5487 F
1080 = EFB4 F
1090 =  F35 F
1100 = AB46 0
1110 = 803F 9
1120 = 973C E
1130 = BB67 3
1140 = 3FFA 6
1150 = 24FA B
1160 = EBB3 A
1170 = 9C32 1
1180 = 91E6 F
1190 = AA92 A
1200 = C962 1
1210 = C468 9
1220 = 44D3 0
1230 = B31C 7
1240 = A388 D
1250 = 6BAA A
1260 = A913 2
1270 = D74E 1
1280 = 9138 0
1290 = 18F6 5
1300 = B317 1
1310 = 1F31 8
1320 = 385E 6
1330 = EC81 8
1340 =  469 5
1350 = 3266 5
1360 = 80F9 1
1370 = C378 0
1380 = 7714 F
1390 = 63EC 3
1400 = 180D E
1410 = 46C2 B
1420 = AD2E A
1430 = E9C7 3
1440 = 4368 6
1450 = 1C0B A
1460 = F5CD 3
1470 = 9C32 9

1480 = 9194 9
1490 = B521 8
1500 = A151 A
1510 =  B0E 7
1520 = C378 D
1530 = DBC2 0
1540 = 609A 9
1550 = C6E6 C
1560 = 24FA 4
1570 = 7192 4
1580 = AFAE 5
1590 = A651 4
1600 = B504 B
1610 = 39F8 3
1620 = 488A F
1630 = 70DA 4
1640 = D3F2 2
1650 = 9C32 D
1660 = 7FA6 8
1670 = E8F9 B
1680 = BDE4 E
1690 = 5C00 4
1700 = 615F 1
1710 = BE56 3
1720 = D15F 8
1730 = E343 9
1740 = 9A68 8
1750 = E26E C
1760 = 45D1 3
1770 =  507 D
1780 = D192 A
1790 = 3DD7 E
1800 = E9C7 7
1810 = 7C52 E
1820 = 89D2 3
1830 = 3B9A 4
1840 = E343 6
1850 = FFB4 0
1860 = CCB3 A
1870 = 5A03 6
1880 = 875E 0
1890 = 388C 3
1900 = A151 5
1910 = D2CD 9
1920 = 5494 F
1930 = 4DED 0

1940 = C5C5 3
1950 = 5FE4 F
1960 = 792A C
1970 = 5DBD 1
1980 = 4DAF 9
1990 = 402D 2
2000 = E343 5
2010 = 9A68 0
2020 =  507 3
2030 = 1D8D 2
2040 = 2795 E
2050 = 594C 6
2060 = 45B7 6
2070 = D8D8 F
2080 = 1609 D
2090 = 3220 E
2100 = C86E 4
2110 = 8A29 B
2120 = D104 B
2130 = 3725 F
2140 = 137E 5
2150 = 48C9 0
2160 = 100A 3
2170 = 7F50 7
2180 =  9E7 2
2190 = 7D44 9
2200 = 5990 5
2210 =  507 A
2220 = 5A1D E
2230 = 45D1 9
2240 = D192 C
2250 = 9549 E
2260 = E9C7 C
2270 = 7C52 5
2280 = D419 9
2290 = 3B9A 0
2300 = E343 2
2310 = FFB4 B
2320 = CCB3 5
2330 = 5A03 3
2340 = B265 F
2350 = 388C 4
2360 = A151 5
2370 = 8388 6
2380 = 5AA3 3
2390 =  9E7 1

2400 = 50B1 E
2410 = 6723 8
2420 = 2373 8
2430 = 7050 D
2440 = A4F6 7
2450 =  9E7 D
2460 = 7EA3 8
2470 = 68B4 C
2480 = ECB5 F
2490 = 86F9 B
2500 = A7EB C
2510 = 6FD8 7
2520 =  6B0 8
2530 = F654 C
2540 = 946A 5
2550 = 1D5C 7
2560 = D419 3
2570 = 3B9A 4
2580 = DBF2 1
2590 =  468 8
2600 = AF90 D
2610 = A920 E
2620 =  CA7 0
2630 = D95F 6
2640 = 4351 6
2650 = 1A9C 2
2660 = 86F9 F
2670 = 5412 C
2680 = A7FC 3
2690 = 44D3 8
2700 = B31C 1
2710 = A388 8
2720 = CB1E 2
2730 = 76DD 2
2740 = 89E7 6
2750 = E8EC D
2760 = DBF2 3
2770 = 3B53 5
2780 = 6D96 F
2790 = 6AC2 8
2800 = A22B 5
2810 =  DF9 C
2820 = 806F C
2830 = B265 1
2840 = 388C 4
2850 =   78 C
2860 = 858B 0
2870 = DBF2 9
2880 = 8A26 B

2890 = AB62 5
2900 =  4CA 4
2910 = DE6A 6
2920 = EBE2 2
2930 = FA58 6
2940 = 858B 7
2950 =  ECD 6
2960 = 577D 3
2970 = 397C E
2980 = C378 8
2990 = E3C6 0
3000 = 5F83 B
3010 = 6E3B B
3020 = 50F9 F
3030 = 7CCF D
3040 = 66E0 7
3050 = 626C E
3060 = 1EB5 9
3070 = E091 C
3080 = EB04 3
3090 = 525F 0
3100 = 373D E
3110 = 3AC9 9
3120 = 1BEB 2
3130 = BADB B
3140 = 18F6 9
3150 = 1976 B
3160 = 6EAC 6
3170 = C042 A
3180 = 52D9 F
3190 = 50B8 C
3200 = 4626 5
3210 = 5FBE 6
3220 = A8DE C
3230 = 1C0B 8
3240 = 21CF 7
3250 = 9C32 C
3260 = 1846 B
3270 = 5009 5
3280 = 303D E
3290 = FF99 C
3300 = 7FA6 B
3310 = ED34 9
3320 = ABA4 5
3330 = 300C B
3340 = 1F4F 4
3350 = 8678 2
3360 = DDB4 1
3370 = CF9E 4

3380 = 45B7 8
3390 = FF99 9
3400 = 7FA6 B
3410 = 9BD9 4
3420 = 3FDC E
3430 = E336 D
3440 = 5453 A
3450 = 8160 5
3460 =  B60 1
3470 = C378 7
3480 = CF84 A
3490 = 300C 7
3500 = 1F4F 2
3510 = 9AAA 1
3520 = 9A19 5
3530 = 1C0B F
3540 = 56FE B
3550 = 7FA6 6
3560 = 522D 4
3570 = 624E F
3580 = 9369 A
3590 = 1C0B B
3600 = 4FAC 2
3610 = 2CAD E
3620 = 391C 4
3630 = A023 F
3640 = DA42 3
3650 = 46B3 E
3660 = C817 1
3670 = 5DA5 5
3680 = B281 9
3690 = 63C0 0
3700 = 18C0 D
3710 = 4924 C
3720 =  8E1 3
3730 = BD64 2
3740 = D59D F
3750 = 5DA5 4
3760 = B281 7
3770 = B19F 2
3780 = 18C0 D
3790 = 1FC6 E
3800 =  8E1 9
3810 = BD64 9
3820 = E260 F
3830 = 6EDE 5
3840 = AC47 E
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3860 =  B43 2
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The land of Shades

by someone who has been there and survived

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It is very hard to get to be a wizard if you are a killer, because you will inevitably be killed a few times yourself, losing your points. But that does not stop people! Many players have two or more characters so they can play one as a killer and one as a more peaceful sort.

Whichever you choose you must know something about fighting or you will be at the mercy of anyone.

In Shades everybody can do some damage with their bare hands. This is your POWER which you can check by typing SCORE. But this is not much use except for killing very weak creatures like the bat and the sprite.

Luckily there are weapons: If you get the axe and type POWER AXE you will see it does 20 points of damage on its own, plus your own bare hands power.

When you are attacked you can type RETALIATE WITH AXE (if you have it) and you will suddenly stand a chance of winning. RET AXE is the short form, and you must get used to employing these shortened forms or you will end up as mincemeat before you even get your spelling right.

If you want to start the fight then you type KILL GUARD or KILL NANJUSI or whoever it is you want to kill. But if you lose a fight you have started you will forfeit all your points instead of half, so be careful. Also it's a good idea to STEAL your opponent's weapon if he has one and do not forget to FLEE OUT if you are losing badly.

Whirlwind's first rule of fighting: Fleeing is more fun than being a corpse, but being a corpse is more fun than doing nothing at all. Fight back hard and the killers may give up eventually.

May the Goddess go with you!
Whirlwind

PS. Hi to Goldie's Ozzzy, Rapunzel, Sharon, Ann, Plutonium and Liane's boyfriend Humber. Also boo, hiss to Comander who is cheeky to the girls: I have your name in my book so I will be killing you soon, he he!

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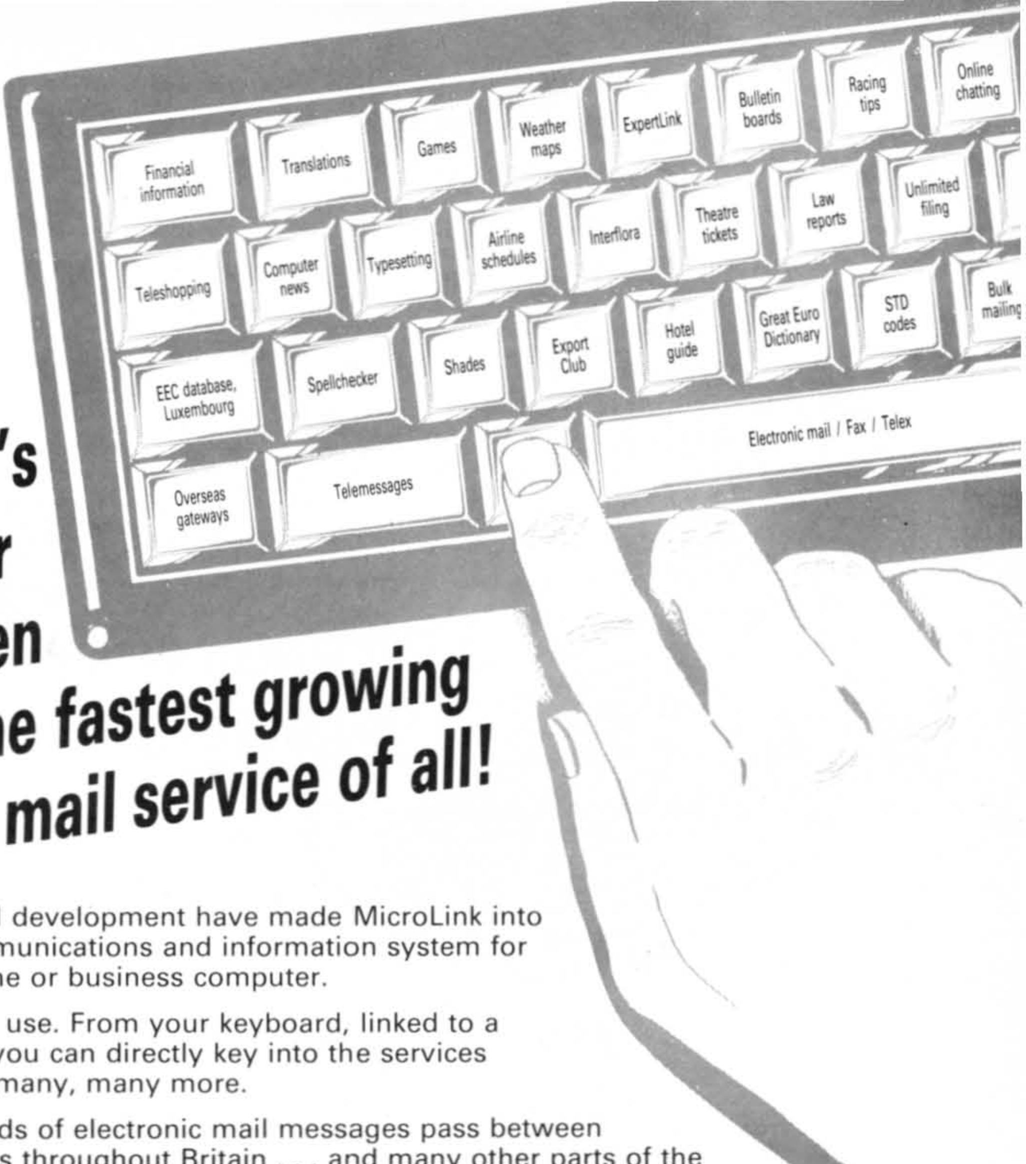

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Master's megabit rom is harbouring bugs

I HAVE recently acquired a Master 128 to replace my old BBC B. So far I have not transferred all my discs to ADFS format and so most of the time I am still using the DFS which is also provided on the Master.

There seem to be a number of bugs in Version 2.24 of the DFS, which forms a part of the megabit rom. I have not seen any reference to these anywhere but they can result in loss or corruption of data. But they are all easy to avoid if you know about them.

*The first is with the CLOSE statement: CLOSE#0 – and its OS equivalent *CLOSE – do not work correctly if the length of any file has been altered since it was opened. Try, for example, the following sequence:*

```
X%=OPENOUT("NAME")
BPUT#X%,1
CLOSE#0
```

There should now be a file on the disc called NAME *of length one byte. The file is there, but if you use *INFO to examine it you will see that it is &4000 bytes long. However, if you replace the CLOSE#0 with CLOSE#X%, the file is given the correct size. The problem seems to be that CLOSE#0 does not update the disc catalogue information.*

When a file is first created using OPENOUT it is assigned a length of &4000 bytes, and it still has this length after using CLOSE#0.

The same thing happens if you extend an open file by adding a few bytes to the end. If there is no change to the number of sectors needed to store the data and CLOSE#0 is used the catalogue is not updated at all and the extra data is lost.

On the other hand, if the extended file does need more sectors, the DFS makes the file as big as possible up to a limit of &10000 bytes – see second bug described later – and using CLOSE#0 gives the same error, the file length is not changed.

The solution involves using individual variables for each file you can have open. Make sure it is set to zero during initialisation, use it for the file handle when the file is in use and when you close the file set it back to zero. Your error routine can then close any file it knows is open by checking its associated variable:

```
 10 outf=0
 20 ON ERROR GOTO 300
 90 outf=OPENOUT"File"
150 CLOSE#outf:outf=0
300 IF outf>0 CLOSE#out
f:outf=0
```

The second bug involves the new feature where you can change the size of an open file by assigning a value to EXT#.

For example, if the file is &600 bytes long and you do:

```
EXT#X%=&200
```

the file is correctly shortened. But if you try to lengthen it using:

```
EXT#X%=&900
```

the DFS does not update the catalogue or assign more space to it – in fact it doesn't even check to see if there is enough room. This means that writing to this file could corrupt others and the end might be overwritten by others. The solution is to use PTR# and not EXT# when extending a file.

*A third bug is the *SHUT command which theoretically closes all files on all filing systems: It has no effect on the DFS and all open files stay open.*

All these bugs are definitely in the DFS and do not appear in the ADFS.

*There is also a bug in the new *MOVE command but this time it's the tape system that's affected. When copying from tape to disc – DFS or ADFS – or vice versa the data is copied correctly.*

But, from tape to disc, every file gets a load address of zero and an execution address of &FFFFFFFF. Going the other way both values are &FFFFFFFF. This means that the method suggested in the Welcome Guide for copying BAS128 to disc won't work. And there are actually two files to copy despite what the Guide says. The following sequence will work correctly:

```
*-TAPE-OPT1,2
*DISC (or *ADFS)
*LOAD -TAPE-BAS128 1000
*SAVE BAS128 1000+7D 400
 400
*LOAD -TAPE-BASOBJ 1000
*SAVE BASOBJ 1000+5000 3
100 3000
```

None of these bugs is particularly serious as long as you know they exist and how to avoid them. But it's a pity they exist even in the new machine – it looks as though Acorn put so much work into getting the ADFS right it forgot to fully check the DFS. – **D. Harper, Brinsley, Nottingham.**

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● **Want to write to The Micro User? The address is: Letters, The Micro User, Europa House, Adlington Park, Adlington, Macclesfield SK10 4NP.**

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Missing symbols

I AM having trouble getting the horizontal and vertical scales to display an ampersand symbol – & – and % sign on screen in the Dumpout Encoder program in the August 1988 issue of The Micro User.

I keyed it in exactly as printed, but I am not familiar with some of the characters used. For example, why is there an apostrophe at some lines as follows?

```
140 PRINT'"What is the
code ...
150 PRINT'"Define which
key ...
```

PROCsize, from 600 on, is where I suspect my problem lies. I am presuming that the symbol on line 610 – between the STR$ and (scale) – is used for converting decimal to hex.

I have also tried changing it for other similar characters, but to no avail. – **Glen Wilson, Langside, Glasgow.**

● The apostrophe in a PRINT statement forces a new line – it's tidier and shorter than PRINT:PRINT, but has the same effect.

It seems that you haven't used Get it Right! to check your listing, as the program is definitely correct as printed. Page 48 in this issue gives details of the checksum program and how to use it.

You are quite correct about the character – pronounced tilda.

Order of the boot

FOR a long time I have been wondering how to write a boot program. Please could you tell me how it is done, or point out a book that could show

Turn to Page 128 ▶

◄ From Page 127

Me? I have a Master Compact but the User Guide does not cover booting your own programs. – **Simon Khoury B.F.P.O.**

● Creating a boot file for a Basic program is quite simple. Let's assume the program you want is called Fred, and the disc with this on is in the drive, just type:

```
*build !boot
```

A line number will appear on screen and you can enter your command there and when you press Return the next line number will be displayed:

```
00001 CHAIN"Fred"
00002
```

Press Escape and the disc drive will spin. If you do a *CAT you'll find that !boot is now on the disc and you can check it by entering:

```
*LIST !boot
```

The final step is to set the boot option for the disc by entering:

```
*OPT 4 3
```

Now you can press Shift+Break to autoboot the disc.

Cunning catalogue capers

I AM having considerable problems with the ADFS catalogue program published in the October issue of The Micro User.

Firstly in the Create program line 330 doesn't match the checksum – but since this bit is for the Archimedes I ignored it and it seems to work okay.

Also when I try to boot the Catalogue program I get a Channel on channel *error which I can't make head nor tail of since the line it happens on has no filing system commands in it at all. But I can CHAIN the program without this problem occurring.*

Next, when I try to add the first disc I get an error related to the fact that one of the files produced in the Create program is called Disc *but in Catalogue it's named* Discs.

This is fairly easy to change, but when I do I get Type mismatch *errors cropping up.*

I'm at my wits end – this looks to be an excellent program – if it would only work. – **Peter Lee, Davenport, Stockport.**

● The boot problem you're having indicates that you're using a Master. Adding *FX119 at line 1 will sort this out.

The other problems – apart from the filename change – are due to the data file always being present as the program was developed. The solution is to create a dummy entry before running the main program.

First delete line 120 from Create and save the program again. Then enter a new Create2 program:

```
10 REM $.Create2
20 ch%=OPENOUT"$.Discs"
30 PRINT#ch%,"Dummy","1"
40 CLOSE#ch%
50 ch%=OPENUP"$.Datafile"
60 PRINT#ch%,"":CLOSE#ch%
```

Now create the catalogue disc by following the instructions in the original article, but run Create2 immediately after Create.

Pinball puzzle

SEVERAL of your readers have written to say that Pinball from the February 1988 issue works very well, but I cannot get it to work at all. I keep getting Bad mode at 210.

Can you help please? – **L.D. Jones, Pitsea, Basildon, Essex.**

● There are two possibilities here: The relocation and line deletion routine have not been typed in correctly or you might have typed in the space after every line number and possibly put spaces at the end of lines. This would add at least 325 bytes to the length of the program unnecessarily.

Using Get it Right!, you can ensure you've typed the program in correctly and when run the checksum listing puts an asterisk after the number to indicate any extra spaces at the ends of lines.

Spaces can only be removed by copying the offending line – but don't copy any additional spaces.

Expert reply

IN the November 1988 issue of The Micro User *Brian MacKenzie gives some modifications for and makes some comments about my Expert program from the September issue.*

The comments are paradoxical in that they are both right and wrong. Yes, it is true that the program forward chains rules – in fact, it forward chains twice if a selected item is investigated further.

However, the backward chain exists in the stage when the user investigates a conclusion, where that conclusion is subsequently related to all facts.

When I wrote the program I contemplated how it should work on numerous occasions: Should it merely backward chain, listing all relevant facts – or should it forward chain listing all conclusions?

Eventually, I decided to perform an initial forward chain, where a desired conclusion could be used to form the beginnings of a backward chain which finally resumes to a forward chain.

Though this may sound finicky, the method works reasonably well – and I do accept that I could have explained this in the text.

I would also like to point out that the program is a practical attempt to emulate an expert system and, to be quite frank, the mentioned computational techniques which are given such grandiose titles are almost intuitive.

They don't really need explaining – as anyone who sits down to write an expert shell will find out.

To leave you with a little puzzle, however. Consider what I call chicken-and-egg rules, where it is not clear which is a fact and which is a conclusion, like so:

```
IF chicken THEN egg
IF egg     THEN chicken
```

Which is which? How should the rules be entered? What chaining technique should be used? Does it matter which is which? Does it matter how they are chained? – **Francis Botto, Gorseinon, Swansea.**

ALL programs printed in this magazine are exact reproduction of listings taken from running programs which have been thoroughly tested.

However, on the rare occasions when mistakes occur corrections are published as a matter of urgency. Should you encounter error messages when you type in a program, they will almost certainly be the result of your own typing mistakes.

Unfortunately we can no longer answer personal programming queries concerning these mistakes. Of course letters about suggested errors will be investigated without delay, but any replies found necessary will only appear in the letters pages.

Superior delivery

I RECENTLY phoned an order to Superior Software who guarantee that all orders are despatched within 24 hours using first class post.

After four days I was getting concerned as to what had happened to my order so, after phoning the Post Office and the staff not being able to *trace anything in the system, I phoned Superior.*

Immediately and without quibble a replacement order was despatched and this arrived the next morning delivered by a security firm.

I would like to say thank you to Superior Software through The Micro User *for not only ensuring its products are superior but its customer service also.*

By the way, I received the original parcel after my replacement order. – **C.J. Teasdale, Dundee.**

Getting into print

I AM a pupil at the Sweyne School and the Needlework Department has just bought a BBC Micro. It requires a package which enables the screen to be dumped to a printer, on special paper, so this can then be ironed on to material. I believe this type of package is available but where from? – **K.A. Chapman, Rayleigh, Essex.**

● You can either use a special ribbon or special paper and you can get details from MGA Microsystems, 023 383 571. To print the screen you can use any screen dump such as Dumpout 3 from Watford Electronics or Printmaster from Beebug.

Type-ins on the Electron

I HAVE an Electron 64k and was wondering if The Micro User *listings can be run on my machine.* – **F. Proffit, Wigan, Lancs.**

● Any of the programs that avoid direct OS and screen access should function correctly, although there's no Mode 7 of course.

Back to the typewriter

IN the July 1988 Problem Solved, Andre John Mas asked about using a Brother typewriter as a printer. I would agree that it is probably more cost effective to get a dot matrix printer, and the results using NLQ are quite good these days, but if you already have the Brother typewriter you may find the following information helpful.

To make the connection you need a buffered interface: This uses a ribbon lead from the printer port on the BBC Micro to a small box about 4in x 8in x 2in, with another lead from that to the back of the typewriter. The box costs £130 from Wildings.

The equipment has given me good service, typing exam papers and other items for which clarity and precision are essential, as well as longer items such as chapters for books.

By using the pause embedded command you can underline or combine characters, although this is slow. Changing the daisywheel lets you use characters specific to other languages, and you can work out which keyboard keys produce which effects simply by pressing each in turn – in lower case, Caps lock and Shift lock – then printing out and working back from the output. – **Alistair H. Thomas, Preston, Lancs.**

Drive decisions

I OWN a Master 128 and the official Acorn Master disc drive unit. I hoped that, although this is 80 track only, I would be able to use the command:

```
*DRIVE 0 40
```

to make use of 40 track discs. Unfortunately, this method is read only, so I wondered whether there is some way to modify the DFS so I can write as well as read these discs.

*Also when you *CAT an ADFS disc, what do the numbers in brackets mean?* – **John Sparrow, Bury, Lancs.**

● As Mike Cook often says, it's not impossible to modify the DFS but just not worth the effort. It's also possible to modify your 80 track drive to 40/80 but, again, this is not the best solution in terms of time, effort and cost.

It is probably best to buy a 40 track drive or trade in your 80 track one for a 40/80 switchable. Alternatively, you could fit a DFS that double steps the drive and allows writing – like the Watford one.

The numbers in brackets give the value of the Master sequence number of the directory when the file was last saved.

Going under in safety

I AM emigrating to Australia and would like to know if it is worth taking my BBC Micro with me. Is there a full range of software available and do new programs reach Down Under?

Have they even heard of the BBC Micro or have they been swamped by some American gizmo that uses a language all of its own? – **Martyn Law, Arbroath, Angus.**

● We're glad to say the BBC Micro is very big in Australia and and you'll not lose out by taking it with you. Several of our readers have told us that *The Micro User* has even featured on a coffee table in *Neighbours* though no one has yet reported sighting a BBC Micro itself.

Those lost chords

I HAVE just invested in a Music 500 and I was impressed with the free demos. But when I wanted to alter the user defined words by:

```
"word " EDIT
```

I could edit the word but not return to the original start piece of the music, as this doesn't seem to have any way of getting to it.

Also, did Peartree ever release the Music 87 software for the Music 500? When I phoned them they disclaimed all knowledge of the matter. Please help. – **A. Emery, Sandy, Beds.**

Ian Waugh replies: By the original start piece of the music do you mean the state of the music before you edited it or the menu of demo tunes?

If you mean the original state of the music, the only way to get this back is to load it again from disc or tape. For example:

```
"POPCORN" LOAD RUN
```

Editing, by its very nature, alters a program and that's what these music pieces are – programs. If you edit an Ample program, a Basic one or one written in any language, you are, by definition altering the original version.

You can load the demo tune menu from disc by entering:

```
"index" LOAD RUN
```

Peartree's ill-fated Music 87 was advertised for more than a year and when it did appear it fell rather short of its claims. As a comprehensive music system it was all but unuseable.

Anyone unfortunate enough to have a Music 87 should contact Hybrid for a Rescue package – Peartree went into liquidation and was taken over and the Music 87 has been well and truly dropped.

Hybrid Technology spent years developing its Music System and it is optimistic, to say the least, to think that a third party developer could equal its fully-integrated software never mind improve upon it, especially in such a short space of time.

Music 500 is the most sophisticated and powerful music system available for the BBC Micro and if you are enjoying it it is certainly worthwhile upgrading to the Music 5000.

It is far easier to use and has several front-end editors which greatly simplify the music creation process. An upgrade pack is available from Hybrid for £99.

Become a real dab hand at programming . . . with this complete guide to the Master Operating System

NEVER BEFORE has so much information about the Master's operating system been brought together in one handy volume!

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The Dabhand Guide costs only £12.95, but for £15.99 you can get both the book AND a 5.25in disc containing all the programs from it. Or for £16.95 you can have the 3.5in version.

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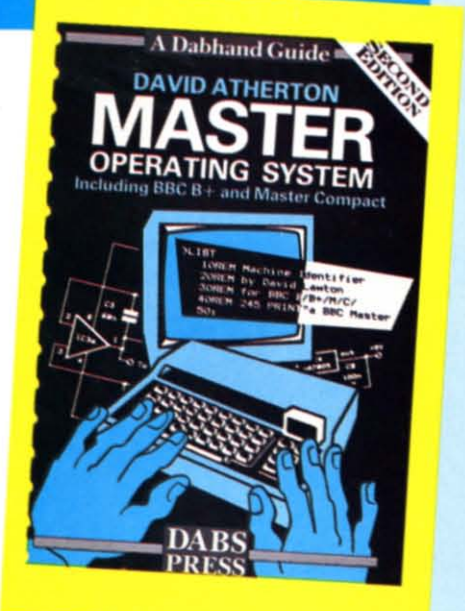

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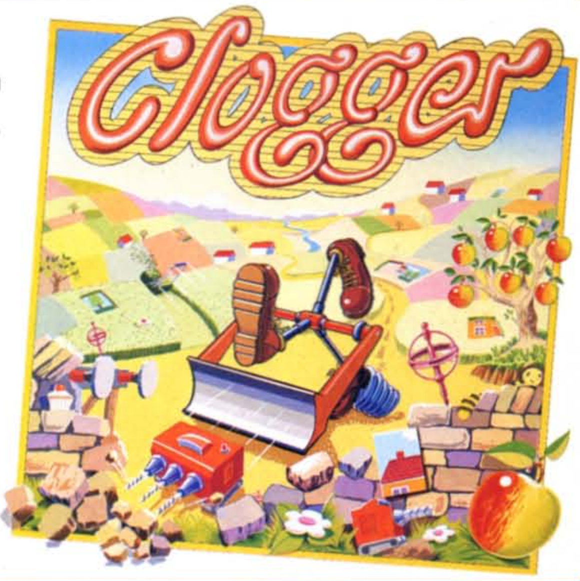

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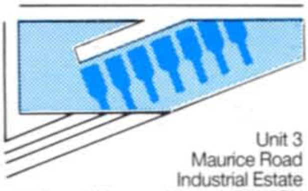

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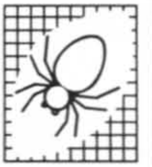

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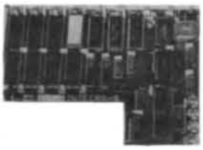

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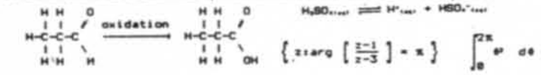

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SEE REVIEW IN BEEBUG Vol. 7, No. 5

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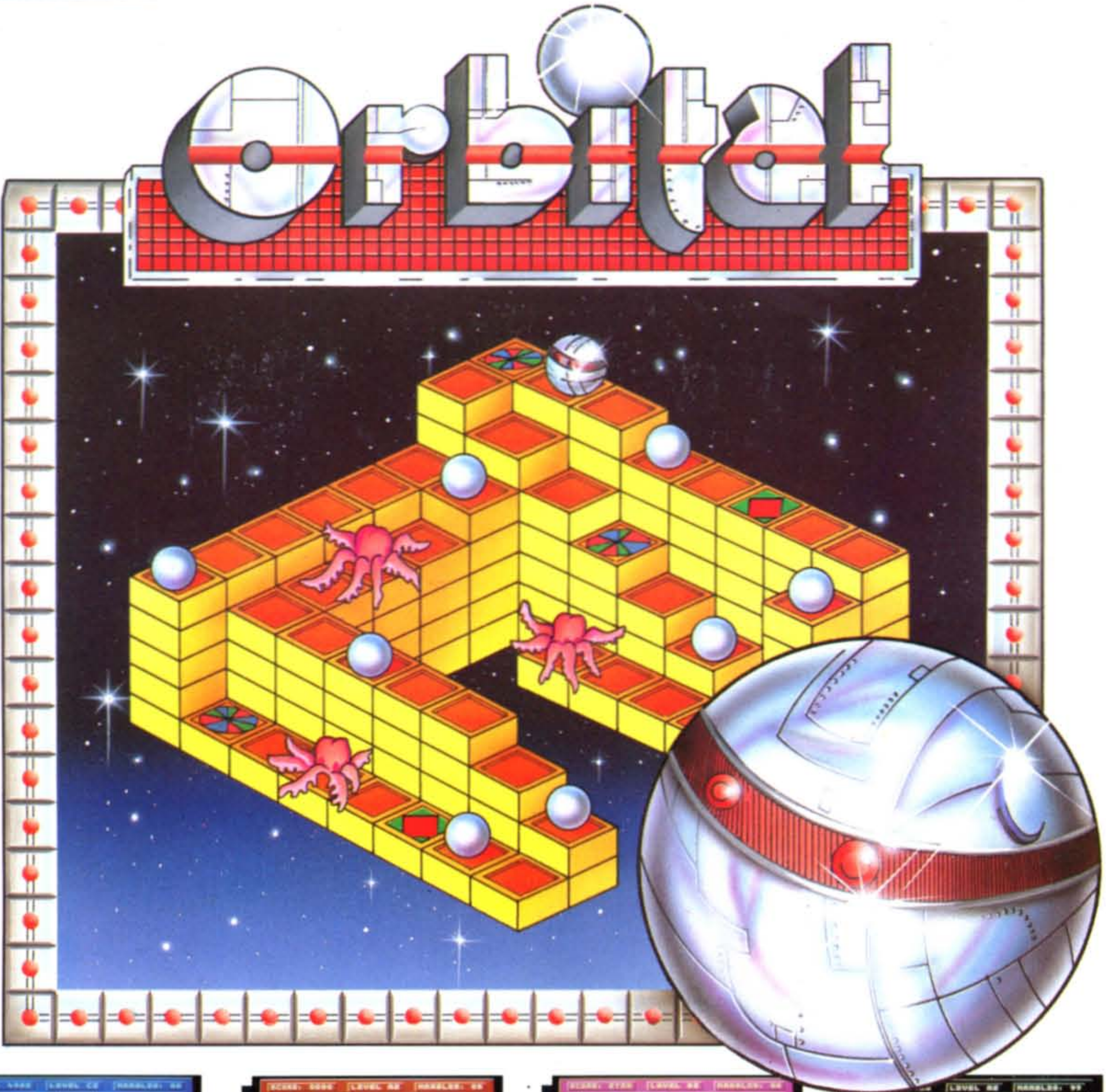

ORBITAL - It's madness

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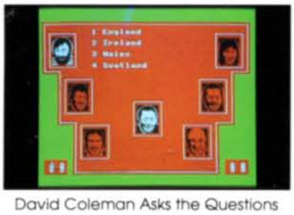

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